Chemistry

1983-2004

JAMB

Questions

Chemistry 1983

1. X is crystalline salt of sodium. Solution of X in water turns litmus red produces a gas which turns lime water milky when added to sodium carbonate. With barium chloride solution, X gives a white precipitate which is insoluble in dilute hydrochloric acid. X is
   A. Na_2,CO_3 B. $NaHCO_3$
   C $NaHSO_4$ D Na_2SO_3
   E. Na_2SO_4

2. The alkanol obtained from the production of soap is
   A. ethanol B. glycerol
   C. methanol D. propanol
   E. glycol

3. The flame used by welders in cotton metals is
   A. butane gas flame
   B. acetylene flame
   C. kerosene flame
   D. oxy-acetylene flame
   E. oxygen flame

4. Consecutive members of an alkane homologous series differ by
   A. CH B. CH_2
   C. CH_3 D. C_nH_n
   E. CnH_{2n+2}

5. If an element has the lectronic configuration $1s^2 2s^2 2p_6$ $3s_2$ $3p_2$, it is
   A. a metal
   B. an alkaline earth metal
   C. an s-block element
   D. a p-block element
   E. a transition element

6. Some copper (11) sulphate pentahydrate ($CuSO_45H_2O$), was heated at 120oC with the following results: Wt of crucible = 10.00 g; Wt of crucible + $CuSO_45H_2O$= 14.98g; Wt of crucible + residue = 13.54g. How many molecules of water of crystallization were lost? [H=1, Cu =63.5, O=16, S= 32]
   A. 1 B. 2
   C. 3 D. 4
   E. 5

7. The three-dimensional shape of methane is
   A. hexagonal B. tigonal
   C. linear D. tertrahedral
   E. cubical

Question 8-10 are based on the following

An unknown organic compound X has a relative molecular mass of 180. It is a colourless crystalline solid, readily soluble in water. X contains the element C, H, and O in the atomic ratio 1:2:1. The compound has a sweet taste and melts on heating. In the presence of yeast and in the absence of air X is converted to compound Y in the absence of air, X is converted to compound Y and colourless gas.
Compound Y reacts with sodium metal to produce a gas Z which gives a 'pop' sound with a glowing splint. Y also reacts with ethanoic acid to give a sweet smelling compound W.

8. Compound W is
   A. a soap B. an oil
   C. an alkane D. an ester
   E. sucrose

9. The molecular formula of X is
   A. $C_{12}H_{22}O_{11}$ B. $C_6H_{12}O_6$
   C. $C_3H_6O_3$ D. $C_7H_{14}O_7$
   E. C_4H3O_4

10. reaction of X with yeast forms the basic of the
    A. plastic industry
    B. textile industry
    C. brewing industry
    D. soap industry
    E. dyeing industry.

11. A mixture of common salt, ammonium chloride and barium sulphate can best be separated by
    A. addition of water followed by filtration then sublimation
    B. addition of water followed by sublimation then filtration
    C. sublimation followed by addition of water then filtration
    D. fractional distillation
    E. fractional crystallization.

12. Which of the following relationships between the pressure P, the volume V and the temperature T, represents and ideal gas behaviors?
    A. P & VT B. P & T/V
    C. PT & V D. PV & VT
    E. P & V/T

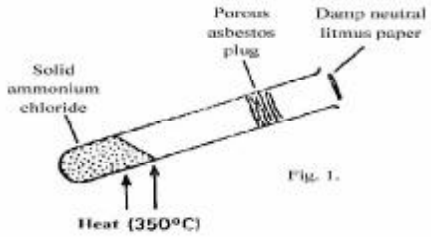
13. 

Fig. 1.

In the above experiment (fig1) the litmus paper will initially
    A. be bleached B. turn green
    C. turn red D. turn blue
    E. turn black

14. The colour imparted to a flame by calcium ion is

A. green B. blue
C. brick-red D. yellow
E. lilac

15. In the reaction $M + N \rightleftharpoons P$; $\triangle H = +Q$ kJ. Which of the following would increase the concentration of the product?

A. Decreasing the concentration of N
B. Increasing the concentration of P
C. Adding a suitable catalyst.
D. Decreasing the temperature

16. In which of the following processes is iron being oxidized?

1. $Fe + H_2SO_4 \longrightarrow H_2 + FeSO_4$
2. $FeSO_4 + H_2S \rightarrow FeS + H_2SO_4$
3 $FeCl + CI_2 \longrightarrow 2FeCL_3$
4 $FeCl_3 + SnCI_2 \longrightarrow 2FeCL_2 + SnCI_4$

A. 1 only B. 2 only
C. 3 only D. 1 and 3
E. 2 and 4.

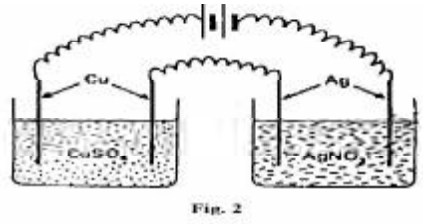
17. 

Fig. 2

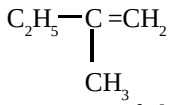
Fig.2

In the above experiment (fig.2), a current was passed for 10 minutes and 0.63 g of copper was found to be deposited on the cathode of $CuSO_4$ cells. The weight of $AgNO_3$ cell during the same period would be [Cu = 63, Ag –108]

A. 0.54 g B. 1.08 g
C. 1.62 g D. 2.16 g
E. 3.24 g

18. In the reaction $Fe + Cu^{2+} \longrightarrow Fe^{2+} + Cu$, iron displaces copper ions to form copper. This is due to the fact that

A. iron is in the metallic form while dthe copper is in the ionic form
B. the atomic weight of copper is greater than that of ion
C. copper metal has more electrons than ion metal
D. iron is an inert metal
E. iron is higher in the electrochemical series than copper.

19. 

The correct name of the compound with the above structural formula is

A. 2-methylbut-1-ene
B. 2-methylbut-2-ene
C. 2-methylbut-1-ene
D. 2-ethyprop-1-ene
E. 2-ethylprop-2-ene

20. How many isomeric forms are there for the molecular formula $C_3H_6Br_2$?

A. 1 B. 2
C. 3 D. 4
E. 5

21. A piece of burning sulphur will continue to burn in a gas jar of oxygen to give misty fumes which readily dissolve in water. The resulting liquid is

A. sulphur (1V) trioxide
B. Tetraoxosulphate acid (V1)
C. Trioxosulphate (1V) acid
D. Dioxosulphate (11) acid
E. Hydrogen sulphide

22. Sodium decahydrate ($Na_2SO_4\ 10H_2O$) an exposure to air loses all its water of crystallization. The process of loss is known as

A. Efflorescence B. Hygroscopy
C. Deliquescence D. Effervescence
E. Dehydration

23. Which of the following happens during the electrolysis of molten sodium chloride?

A. Sodium ion loses an electron
B. Chlorine atom gains an electron
C. Chloride ion gains an electron
D. Sodium ion is oxidized
E. Chloride ion is oxidized.

24. Crude petroleum pollutant usually seen on some Nigeria creeks and waterways can be dispersed or removed by.

A. heating the affected parts order to boil off the petroleum
B. mechanically stirring to dissolve the petroleum in water
C. pouring organic solvents to dissolve the petroleum
D. spraying the water with detergents
E. cooling to freeze out the petroleum.

25. An element is electronegative if

A. it has a tendency to exist in the gaseous form
B. its ions dissolve readily in water
C. it has a tendency to lose electrons
D. it has a tendency to gain electrons
E. it readily forms covalent bonds

26. Solution X,Y, and Z have pH values 3.0, 5.0 and 9.0 respectively. Which of the following statements is correct?

A. All the solution are acidic
B. All solution are basic
C. Y and Z are more acidic than water
D. Y is more acidic than X.
E. Z is the least acidic

27. In the reactions

(1) H2 (g) + 1
$2\ O_2(g)$ $H_2O(1)$; H =-2.86kJ

(11) $C(s) + O_2(g)$ $CO_2(g)$; H= -406 kJ

the equations imply that

A. more heat is absorbed heat is evolved in (1)
B. more heat is absorbed in (11)
C. less heat is evolved in (1)
D. reaction (11) proceeds faster than (1)
E. reaction (1) proceeds faster than (11)

28. Which of these metals, Mg, Fe, Pb, and Cu will dissolve in dilute HCI?
A. All the metals
B. Mgm Fe, and Cu
C. Mg, Fem and Pb
D. Mg and Fe only
E. Mg only

29. Stainless steel is an alloy of
A. Carbon, iron and lead
B. Carbon, ion and chromium
C. Carbon iron and copper
D. Carbon, iron and silver
E. Carbon and iron only

30. What volume of 0.50 MH_2SO_4 will exactly neutralize 20cm^3 of 0.1 M NaOH solution?
A. 2.0 cm^3 B. 5.0 cm^3
C. 6.8 cm^3 D. 8.3 cm^3
E. 10.4 cm^3

31. Which of the following pair of gases will NOT react further with oxygen at a temperature between 30°C and 400°C?
A. SO_2 and NH_3 B. CO_2 and H_2
C. NO_2 and SO_3 D. SO_3 and NO
E. CO and H^2

32. Some metals are extracted from their ores after some preliminary treatments by electrolysis (L) some by thermal reaction(T) and some by a combination of both processes(TL). Which set-up in the following for the extraction of iron copper and aluminum is correct?
A. Iron (L), copper (L) m aluminum (T)
B. Iron (T), copper (L), aluminum (T)
C. Ion (TL), copper (TL), aluminium (TL)
D. Iron (L), copper (T), aluminium (T).
E. Ion (T), copper (L), aluminium (TL).

33. In the preparation of some pure crystals of Cu $(NO_3)_2$ starting with CuO, a student gave the following statements as steps he employed. Which of these shows a flaw in his report?
A. Some CuO was reacted with excess dilute H_2SO_4
B. The solution was concentrated
C. When the concentrate was cooled, crystals formed were removed by filtration.
D. The crystals were washed with very cold water
E. The crystals were then allowed to dry.

34. Which of the following seperation processes is most likely to yield high quality ethanol (>95%) from palm wine?
A. Fractional disllation without a dehydrant
B. Simple distillation without a dehydrant
C. Fractional distillation with a dehydrant
D. Column chromatography
E. Evaporation

35. Increasing the pressure of a gas
A. lowers the average kinetic energy of the molecules
B. decreases the density of the gas
C. decreases the temperature of the gas
D. increases the density of the gas
E. increases the volume of the gas.

36. 2.5 g of a hydrated barium salt gave on heating, 2.13 g of the anhydrous salt. Given that the relative molecular mass of the anhydrous salt is 208, the number of molecules of water of crystallization of the barium salt is
A. 10 B. 7
C. 5 D. 2
E. 1

37. 3.06 g of a sample of potassium trioxochlorate (v) ($KCIO_3$) was required to make a saturated solution with 10cm3 of water at 25°C. The solubility of the salt at 25°C is [K =39, CI =35.5, O=16]
A. 5.0 moles dm^3 B. 3.0 moles dm^3
C. 2,5 moles dm^3 D. 1.0 moles dm^3
E. 0.5 moles dm_3

38. The cracking process is very important in the petroleum industry because it
A. gives purer products
B. Yields more lubricants
C. Yields more engine fuels
D. Yields more asphalt
E. Yield more candle wax

39. A gas that can behave as reducing agent towards chlorine and as an oxidizing agent toward hydrogen sulphide is
A. O_2 B. NO
C. SO_2 D. NH_3
E. CO_2

40. Which if the following solution will give a white precipitate with barium chloride solution and a green flame test?
A. $Na2SO_4$ B. CuSO4
C. $CaSO_4$ D. $CaCI_2$
E. $(NH_4)_2SO_4$

41. The mass of an atom is determined by
A. its ionization potential
B. its electrochemical potential
C. the number of protons
D. the number of neutrons and protons
E. the number of neutrons and electrons

42. Which of the following is neutralization reaction?
A. Addition of chloride solution
B. Addition of trioxonirate (V) acid (nitric acid) to distilled water.
C. Addition of trioxonirate (V) acid (nitric acid) to tetraoxosulphate (V1) acid (sulphuric acid).

D. Addition of trioxonirate (V) (potassium nitrate) solution
E. Addition of trioxonirate (V) acid (nitric acid) potassium hydroxide solution.

43. A jet plane carrying 3,000 kg of ethane burns off all the gas forming water and carbondioxide. If all the carbondioxide is expelled and the water formed is condensed and kept on board the plane, then the gain in weight is
A. 1,800 kg B. 900 kg
C. 600 kg D. 2,400 kg
E. 1,200kg

44. Liquid X, reacts with sodium trioxocarbonate (IV) (Na_2CO_3) to give a gas which turns calcium chloride solution milky. X is
A. Na_2SO4 (aq) B. KI (ag)
C. An alkali D. An acid
E. A hydrocarbon.

45. Which of the following statements is FALSE?
A. copper (11) ion can be reduced to copper (1) ion by hydrochloric acid and zinc.
B. Sodium metal dissolves in water giving oxygen
C. Nitrogen is insoluble in water
D. Carbondioxide is soluble in water
E. Lead has a higher atomic weight than copper

46. When sodium dioxonitrate (111) ($HaNO_2$ \) dissolves is
A. Exothermic B. Endothermic
C. Isothermic D. Isomeric
E. Hydroscopic

47. The equilibrium reaction between copper (1) chloride and chloride at 25°C and 1 atmosphere is represented by the equation:
$2CuCI_2 + CI_2 \Longleftrightarrow 2CuCI_2$ H = -166kJ . Which of the following statement is TRUE for the reaction, pressure remaining constant.
A. More $CuCI_2$ is formed at 40°C
B. More $CuCI_2$ is formed at 10°C
C. Less $CuCI^2$ is formed at 10°C
D there is no change $CuCI_2$ formed at 40°C and 10°C
E. More $CuCI_2$ is consumed at 40°C

48. $Zn + H^2SO_4 \longrightarrow ZnCI_2 + H_2$
The rate of the above reaction will be greatly increased if.
A. the zinc is in the powered form
B. a greater volume of the acid is used
C. a smaller volume of the acid is used
D. the reaction vessel is immersed in an ice-bath
E. the zinc is in the form of pellets.

49. $Zn + H_2SO_4 \longrightarrow ZnSO_4 + H_4$
In the above reaction how much zinc will be left undissolve if 2.00 g of zinc treated with $10cm_3$ of 1.0 M of H_2SO_4? [Zn =65, S=32, O = 16, H = 1]
A. 1.35 g B. 1.00 g
C. 0.70 g D. 0.65 g
E. 0.06 g

50. 30cm3 of 0.1 M AI(NO3)3 solution is reacted with 100cm3 of 0.15M of NaOH solution. Which is in excess and by how much?
A. NaOH solution, by 70cm3
B. NaOH solution, by 60cm3
C. NaOH solution by 40cm3
D. AI $(NO^3)^3$, solution by 20cm3
E. AI $(NO^3)^3$ solution, by $10cm^3$

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1. Sodium chloride may be obtained from brine by
A. titration B. decantation
C. distillation D. evaporation
E. sublimation

2. $20cm^3$ of hydrogen gas are sparked with $20cm^3$ of oxygen gas in an eudiometer at 373K (100°C) and 1 at atmosphere. The resulting mixture is cooled to 298 K (25°C) and passed over calcium chloride. The volume of the residual gas is
A. $40cm^3$ B. $20cm^3$
C. $30cm^3$ D. $10cm^3$
E. $5\ cm_3$

3. For the reaction $NH_4\ NO_2 \longrightarrow N_2 + 2H_2O$ calculate the volume of nitrogen that would be produced at S.T.P from 3.20 g of the trioxonirate (111) salt.
A. 2.24 dm^3 B. 2.24 cm^3
C. 1.12 cm^3 D. 1.12 dm^3
E. 4.48dm^3
(Relative atomic masses: N = 14m O =16, H=1).

4. Manganese (1V) oxide reacts with concentrated hydrochloric acid according to the equation
$MnO_2 + xHCI \longrightarrow MnCI_2 + CI + yH_2O$. x and y are
A. 2 and 5 respectively
B. 2 and 4 respectively

C. and 2 respectively
D. 4 and s2 respectively
E. 4 and 1 respectively

5. A molar solution of caustic soda is prepared by dissolving
A. 40 g NaOH in 100 g of water
B. 40 g NaOH in 1000 g of water
C. 20 g NaOH in 500 g of solution
D. 20 g NaOH in 1000 g of solution
E. 20 g NaOH in 80 g of solution.

6. Which among the element 1. Carbon 2. Oxygen 3. Copper 4. Bromine 5. Zinc will NOT react with either water of stream?
A. 1 and 2 B. 2 and 3
C. 3 and 4 D. 1, 2, and 3
E. 2, 3 and 5

7.

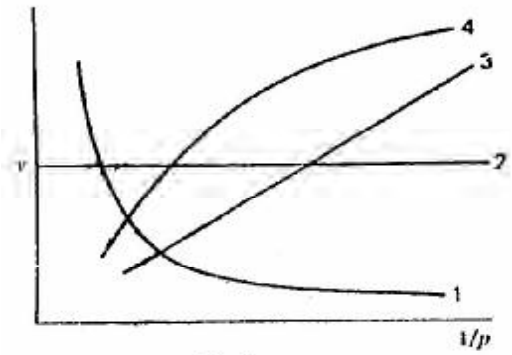

Fig 1

Fig 1
Which of the curves shown in fig 1 represents the relationships between the volume (v) and pressure (p) of an ideal gas at constant temperature?
A. 1 B. 2
C. 3 D. 4
E. 1 and 3

8. Naphthalene when heated melts at 354K (81°C) . At this temperature the molecules of naphthalene .
A. decompose into smaller molecules
B. change their shape
C. are oxidized by atmospheric oxygen
D. contract
E. become mobile as the inter molecular forces are broken.

9. The ration of the number of molecules in 2g of hydrogen to that in 16 g of oxygen is
A. 2:1 B. 1:1
C. 1:2 D. 1:4
E. 1:8

10. Which combination of the following statements is correct?
1. lowering the activation energy
2 conducting the reaction in a gaseous state
3. increasing the temperature
4. removing the products as soon as they are formed
5. powdering the reactant if solid
A. 1,2 and 3 B. 1, 3 and 5
C. 2, 3 and 5 D. 3 and 4
E. 3 and 5

11 The balance equation for the reaction of tetraoxosulphate (V1) acid with aluminium hydroxide to give water and aluminium tetraoxosulphate (V1) is
A. $H_2SO_4 + AISO_4 \rightarrow 2H_2O + AISO_4$
B. $HSO_4 + AIOH \rightarrow H_2O + AISO4$
C. $3H2SO_4 + 2AIH_3 \rightarrow 6H2OH + AI(SO_4)_3$
D. $3H2SO4 + 2AI(OH)3 \rightarrow 6H2O + AI(SO_4)_3$
E. $H_2SO_4 + AI(OH)_3 \rightarrow H_2O + AI_2(SO4)_3$

12.

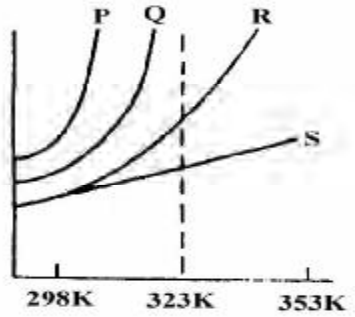

Fig.2.

Fig. 2.
The solubility curves of four substances are shown in Fig.2. Which of the four substances would crystallize from a saturated solution cooled from 353 K (80°C) to 323 K (50°C)
A. P and Q B. P and R
C. P and S D. R and S
E. Q and R.

13. which of the following mixtures would result in a solution of pH greater than 7?
A. 25.00 cm^3 of 0.05 M H_2SO_4 and 25.00 cm^3 of 0.50 m Na_2CO_3
B. 25.00 cm^3 of 0.50 M H_2SO_4 and 25;00 cm^3 of 0.10 M $NaHCO_3$
C. 25.00 cm^3 of 0.11 M H_2SO_4 and 25.00 cm^3 of 0.10 M NaOH
D. 25.00 cm^3 of 0.11 M H_2SO_4 and 50.00 cm^3 of 0.50 M NaOH
E. 25.00 cm^3 of 0.25 MH_2SO_4 and 50.00 cm^3 of) .20 M NaOH

14. In which of the following reactions does hydrogen peroxide acts as a reducing agent?
A. $H_2S + H_2O \rightarrow S + 2H_2O$
B. $PbSO_3 + H_2O_2 \rightarrow PbSO_4 + H_2O$
C. $2'! + 2H + H_2O \rightarrow I_2 + 2H_2O$
D. $PbO_2 + 2HNO_3 + H_2O_2 \rightarrow Pb(NO_3)_2 + 2H_2O + O_2$
E. $SO + H_2O_2 \rightarrow H_2SO_4$

15. For the reaction $2Fe + 2^{e-} \rightarrow 2Fe^{2+} + I_2$, which of the following statements is TRUE?
A. Fe is oxidized to Fe_3
B. Fe^{3+} is oxidized to Fe^{2+}

C. I^- is oxidized to I_2
D. I- is reduced to I_2
E. I^- is displacing an electron from Fe^{3+}

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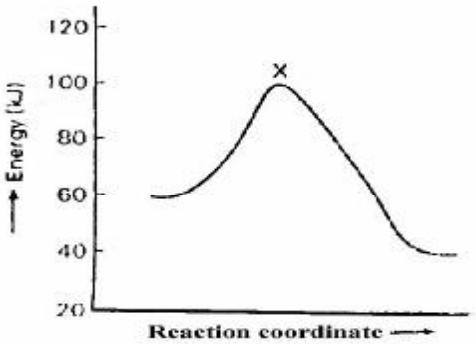


Fig. 3

The diagram above (Fig.3) shows the energy profile for the reaction A+B = C+ D. form this diagram, its clear that the reaction is

A. spontaneous B. isothermal
C. adiabatic D. exothermic
E. endothermic

17. In dilute solute the heat of the following NaOH + HCI = NaCI + H_2O + H_2SO_4 ⟶ Na_2SO_4 + $2H_2O$ is

A. +28.65 kJ B. –28.65kJ
C. +57.3 kJ D. –114.6 kJ
E. –229.2 kJ

18. For the reactions: (1 Melon oil + NaOH□! Soap + Glycerol (11) 3Fe + 4H2O⟶ Fe_3O_4 + $4H_2$ (111) N_2O_4 $2NO_2$. Which of the following statements is true?

A. Each of the three reactions requires a catalyst
B. All the reactions demonstrate Le Chatelier's principle
C. The presence of a catalyst will increase the yield of products
D. Increase in pressure will result in higher yields of the products in 1 and 11 only
E. Increase in pressure will result in higher of the products in 111 only.

19. Which of the following methods may be used to prepare trioxonirate (V) acid (nitric acid) in the laboratory?

A. Heating ammonia gas with tetraoxosulphate (1V) acid
B. Heating ammonium trioxosulphate (V) with tetraoxonitrate (V) acid
C. Heating sodium trioxonirate (v) with tetraoxosulphate (V1) acid
D. Heating potassium trioxonirate (V) with calcium hydroxide.
E. Heating a mixture of ammonia gas and oxygen\

20. Lime –water, which is used in the laboratory for the detection of carbon (1V) oxide, is an aqueous solution of:

A. Ca (OH)$_2$ B. $CaCO_3$
C. $CaHCO_3$ D. $CaSO_4$
E. N_2CO_3

21. An element that can exist in two or more different structure forms which possess the desame chemical properties is said to exhibit

A. polymerism B. isotropy
C. isomorphism D. isomerism
E. allotropy.

22. Sulphur….

A. Forms two alkaline oxides
B. Is spontaneously flammable
C. Burns with a blue flame
D. Conducts electricity in the molten state
E. Is usually stored in the form of sticks in water.

23. Which off the following statements is NOT true of carbon monoxide?

A. CO is poisonous
B. CO is readily oxidized at room temperature by air to form Co_2
C. CO may be prepared by reducing CO_2, mixed coke heated to about 1000°C
D. CO may be prepared by heating charcoal with a limited amount of O_2
E. CO is a good reducing agent.

24. From the reactions:
ZnO + Na_2O ⟶ Na_2ZnO and
ZnO+ CO2⟶ $ZnCO^3$ it may be concluded that zinc oxide is

A. neutral B. basic
C. acidic D. amphoteric
E. a mixture

25. An example of a neutral oxide is

A. AL_2O_3 B. NO_2
C. CO_2 D. CO
E. SO_2

26. $3CI_2$+ $2NH_3$ ⟶ N_2 + 6HCI. In the above reaction, ammonia acts as .

A. a reducing agent
B. an oxidizing agent
C. an acid
D. a catalyst
E. a drying agent

27. In the Haber process for the manufacturer of ammonia, finely divided iron is used as

A. an ionizing agent
B. a reducing agent
C. a catalyst
D. a dehydrating agent
E. an oxidizing agent.

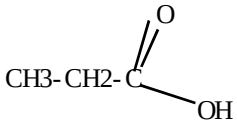
28. An organic compound with a vapour density 56.5 has the following percentage composition: C = 53.1%, N = 12.4%, O = 28.3%, H = 6.2%. The molecular formula of the compound is

A. $C_3H_6O_2N$ B. $C_5H_6O_2N$
C. $(C_5H_7O_2N)$½ D. $C_5H_7O_2N$
E. $(C_5H_7ON)_2$.

Relative atomic masses: N = 12.4%, O = 28.3%, H = 1)

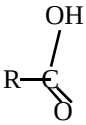
29. The hybridization of the carbon atom in ethyne is
A. Sp^ B. sp^3
C. sp^2 D. sp
E. s

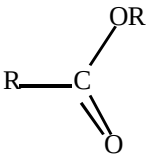
30. When the kerosene fraction form petrol is heated at high temperature, a lower boiling liquid is obtained. This process is known as
A. polymerization B. refining
C. hydrogenation D. cracking
E. fractional distillation

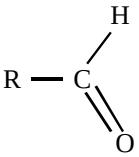
31. 

Is
A. acetic acid B. propanal
C. propanol D. ethanoic acid
E. propanoic acid

32. Alkaline hydrolysis of naturally occurring fats and oils yields.
A. fats and acids
B. soaps and glycerol
C. margarine and butter
D. esters
E. detergents.

33. Which of the following represents a carboxylic acid?
A. 

B. 

C. H2SO4,
D. R - COOCOR
E. 

34. which of the statement is INCORRECT?
A. fractional distillation of crude petroleum will give following hydrocarbon fuels in order of increasing boiling point: Butane < petrol < kerosene
B. $H_2C = CH_2$ will serve as a monomer in the preparation of polythene
C. Both but – 1- ene and but –1-1yne will decolorize bromine readily.
D. But –2 – ene will react with chlorine to form 2, 3 – dichlorobutane.
E. Calcium carbide will react with water to form any alkayne

35. which of the following statement is NOT correct about all four of the acids: HBr, HNO_3 H_2CO_3 and H_2SO_4? They
A. dissolve marble to liberate litmus red
B. have a pH less than 7
C. turn blue litmus red
D. neutralize alkalis to form salt
E. react with magnesium to liberate hydrogen.

36. If the cost of electricity required to deposit 1 g old magnesium is N5.00. How much salt would it cost to deposit 10 g of aluminium?
A. N10.00 B. N27.00
C. N44.44 D. N66.67
E. N33.33.
(Relative atomic masses: AI = 27, Mg = 24).

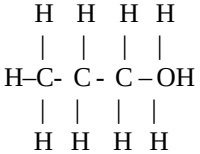
37, In an experiment, copper tetraoxosulphate (V1) solution was electolysed using copper electrodes, The mass of copper deposited at the cathode by the passage of 16000 coulombs of electricity is
A. 16.70 g B. 17. 60g
C. 67.10 g D. 10. 67 g
E. 60.17 g
(Relatively atomic masses: Cu = 63.5m O = 16, H = 1, S = 32).

38. $^{3}_{1}R$ $^{19}_{9}U$ $^{24}_{12}S$ $^{20}_{10}T$ $^{19}_{7}$. Which of the following statements is NOT true of the elements R, U, S, T, Y?
A. R is an isotope of hydrogen
B. U and Y are isotopes
C. R,U,S and T are metals
D. T is a noble gas
E. S will react with oxygen to form SO

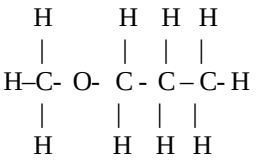
39. Nitrogen can best be obtained from a mixture of oxygen and nitrogen by passing the mixture over
A. potassium hydroxide
B. heated gold
C. heated magnesium
D. heated phosphorus
E. calcium chloride.

40. Water is said to be 'hard' if it
A. easily forms ice
B. has to be warmed before sodium chloride dissolves in it
C. forms an insoluble scum with soar
D. contains nitrates
E. contains sodium ions.

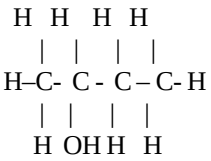
41. Sodium hydroxide (NaOH) pellets are
A. deliquescent B. hygroscopic
C. efflorescent D. hydrated
E. fluorescent.

42. Which of the following structure formulae is NOT numeric with others?
A. 

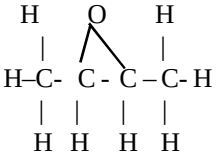
B.



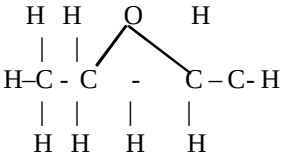
C.



D.



E.



43. Alkalines
A. are all gases
B. have the general formula $C_nH_{2n} + {}_2O$
C. contains only carbon and hydrogen
D. are usually soluble in water
E. are usually active compounds.

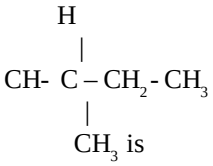
44. If an excess of a liquid hydrocarbon is poured into a jar of chlorine, and the sealed jar is then exposed for several hours to bright sunlight, all the chlorine gas is consumed. The hydrocarbon is said to have undergone
A. a polymerization reaction
B. an isomerixation reaction
C. an addition reaction
D. a substitution reaction
E. a reduction reaction

45. The function of conc. H_2SOH_4 in the etherification of ethanoic acid with ethanol is to
A. serves as a dehydrating agent
B. serves as solvent
C. act as a catalyst
D. prevent any side reaction
E. serve as an oxidizing reaction

46. A piece of sea shell, when dropped into a dilute solution of hydrochloric acid produces a colourless odorless gas, which turns clear limewater milky. The shell contains
A. sodium chloride
B. ammonium nitrate
C. calcium carbonate
D. calcium chloride
E. magnesium chloride

48. An aqueous solution of a metal salt, Mm gives a white precipate with NaOH, which dissolves in excess NaOH. With aqueous ammonium the solution of M also gives a white precipate which dissolves in excess ammonia. Therefore the caution in M is
A. Zn^{++}
B. Ca^{++}
C. AI^{+++}
D. Pb^{++}
E. Cu^{++}

49. The I.U.P.A. C name for the compound



A. isopropylethene
B. acetylene
C. 3-methylbutane
D. 2-methybutane
E. 5-methypentane.

50. At S.T.P how many litres of hydrogen can be obtained from the reaction of $500cm^3$ of 0.5 M H_2SO_4 excess zinc metal.
A. $22.4\,dm_3$
B. $11.2\,dm_3$
C. $6.5\,dm_3$
D. $5.6\,dm_3$
E. $0.00\,dm_3$
(Gram molecular volume of H2 = $22.4\,dm_3$)

Chemistry 1985

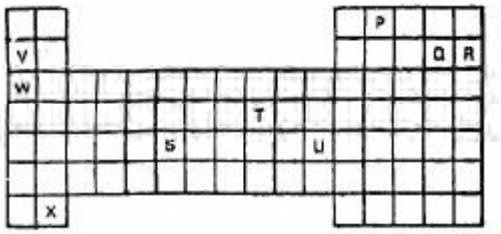


Fig. 1

1. Figure shows part of the periodic Table. Which of the elements belongs to the p-block?
   A. S,T and U.
   B. V, W and X
   C. S and T only
   D. P, Q and R
   E. V,W, X and S.

2. Which of the following conducts electricity?
   A. Sulphur B. Graphite
   C. Diamond D. Red phosphorus
   E. Yellow phosphorus.

3. An organic compound contains 72% carbon 12% hydrogen and 16% oxygen by mass. The empirical formula of the compound is
   A. $C_6H_{22}O_3$ B. $C_6H_{10}O_3$
   C. $C_{12}H_{12}O$ D. $C_6H_{12}O$
   E. C_3CH_{10}
   (H= 1, C = 12, O= 16).

4. 0.499 of $CuSO_4.xH_2O$ when heated to constant weight gave a residue of 0.346 g. The value of x is
   A. 0.5 B. 2.0
   C. 3.0 D. 4.0
   E. 5.0.
   (Cu = 63.5, S = 32.0 O = 16, H = 1).

5. In an experiment which of the following observation would suggest that a solid sample is a mixture? The
   A. solid can be ground to a fine powder
   B. density of the solid 2.25 g dm-3
   C. solid begins to melt until 648 K
   D. solid absorbs moisture from the atmosphere and turns into a liquid
   E. solid melts at 300 K.

6. Hydrogen diffuses through a porous plug
   A. at the same rate as oxygen
   B. at a slower rare than oxygen
   C. twice as fast as oxygen
   D. three times as fast as oxygen
   E. four times as fast as oxygen.

1. Given the molecular mss of iron is 56 and that of oxygen is 16, how many moles of Iron (111) oxide will be contained in 1 kg of the compound?
   A. 25.0 moles B. 12.5 moles
   C. 6.25 moles D. 3.125 moles
   E. 0.625 moles

8. 3.0 g of a mixture of potassium carbonate and potassium chloride were dissolved in a 250cm^3 standard flask. 25 cm_3 of this solution required 40.00cm^3 of 0.1 M HCI for neutralization. What is the percentage by weight of K_2CO_3 in the mixture?
   A. 60 B. 72
   C. 82 D. 89
   E. 92 (K = 39, O = 16, C = 12).

Figure 2 below represents the solubility curb\ves of two salts, X and Y, in water. Use this diagram to answer question9 to 11

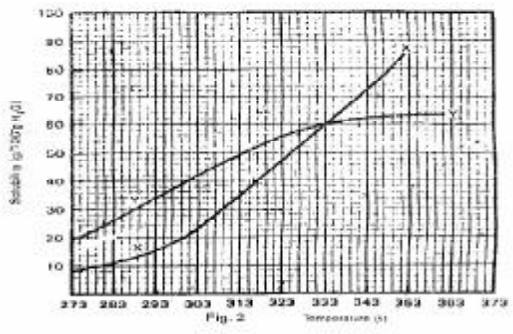


Fig. 2

9. At room temperature (300K)
   A. Y is twice as soluble as X
   B. X is twice as soluble as Y
   C. X and Y soluble to the same extent
   D. X is three times as soluble as Y
   E. Y is three times as soluble as X

10. If 80 g each of X and Y are taken up in 100g of water at 353 K we shall have.
   A. only 10 g of X and Y undissolve
   B. only 16 g of Y undissolve
   C. 10 g of X and 16 g of Y undissolved
   D. all X and Y dissolved
   E. all X and Y undissolved

11. If the molar mass of X is 36 g, the number of moles of X dissolved at 343 is
   A. 0.2 moles B. 0.7 moles
   C. 1.5 moles D. 2.0 moles
   E. 3.0 moles

12. Some properties of chemical substances are mentioned below (i) solar taste (ii)slippery to touch (iii)yields alkaline gas with ammonium salts (iv) has pH less than 7 (v) turns phenolphthalein pink. Which of the above are NOT typical properties of alkaline?
   A. (i), (iv) and (v)
   B. (iv) and (v)

C. (i) and (iv)
D. (ii) and (v)
E. (ii), (iii) and (v)

13. A certain volume of a gas at 298K is heated such that its volume and pressure are now four times the original values. What is the new temperature?
A. 18.6 K B. 100.0 K
C. 298.0 K D. 1192.0 K
E. 47689.0 K

14. Hydrogen is not liberated when trioxonirate (v) acid reacts with zinc because
A. Zinc is rendered passive by the acid
B. Hydrogen produced is oxidized to water
C. Oxides of nitrogen are produced
D. All nitrates are soluble in water
E. trioxonitrate v acid is a strong acid.

15. The boiling points of water, ethanol, toluene and button-2-ol are 373.OK, 351.3K, 383.6 K and 372.5 K respectively. Which liquid has the highest vapour pressure at 323.0K?
A. water B. Toluene
C. Ethanol D. Butan-2-ol
E. None

16. In what respect will two dry samples of nitrogen gas differ from each other if samples 1 is prepared by completely removing CO_2 and O_2 from air and sample 2 is prepared by passing purified nitrogen (i) oxide over heated copper? Sample 1 is
A. purer than sample 2
B. slightly denser than sample 2
C. in all respects the same as sample 2
D. colourless but sample 2 has a light brown.
E. slightly less reactive than sample 2

17. Copper sulphate solution is electrolyzed using platinum electrodes. A current of 0.193 amperes is passed for 2hrs. How many grams of copper are deposited?
A. 0.457 g B. 0.500 g
C. 0.882 g D. 0.914 g
E. 1.00 g (Cu = 63.5m F = 96500 coulombs)

18. $X + Y \rightleftharpoons Z$ is an equilibrium reaction. The addition of a catalyst
A. increases the amount of W produced in a given time
B. increase the rate of change in concentrations of X, Y and Z
C. increases the rate of disappearance of X and Y
D. increases the rate of the forward reaction
E. decreases the amounts of X and Y left after the attainment of equilibrium.

19. What is the formula of sodium gallate if gallium (Ga) shows an oxidation number of +3.
A. $NaGaO_3$ B. $Na_2G(OH)_2$
C. $NaGa(OH)_3$ D. $NaGa(OH)_4$
E. NaGaO

20. If the ONLY pollutants found in the atmosphere over a city are oxides of nitrogen suspended lead compounds, carbon monoxide and high level of methane, the probable source(s) of the pollution must be
A. automobile exhaust and biological decomposition
B. combustion of coal and automobile exhaust
C. biological decomposition only
D. combustion of coal, automobile exhaust and biological decomposition
E. combustion of coal and biological decomposition.

21. A correct electrochemical series can be obtained from K, Na, Ca, Al, Mg, Zn, Fe, Pb, H, Cu, Hg, Ag, Au by interchanging
A. Al and Mg B. Zn and Fe
C. Zn and Pb D. Pb and H
E. Au and Hg.

22. A certain industrial process is represented by the chemical equation $2A(g) + B_{(g)}$ '! $C_{(g)} + 3D_{(g)}$ H = XkJ mol^-. Which of the following conditions will favour the yield of the product?
A. Increases in the temperature, decrease in pressure.
B. Increase in temperature increase in pressure
C. Decrease in temperature, increase in pressure
D. Decrease in temperature, increase in pressure.
E. Constant temperature, increase in pressure.

23. $2MnO_4^- + 10Cl^- + 16H +$ '! $2Mn^{2+} + 5Cl_2 + 8H_2O$. which of the substances serves as an oxidizing agent?
A. Mn^{2+} B. Cl^-
C. H_2O D. MnO_4
E. Cl_2

24. In the reaction $H_2O_{(g)}$ '! $H2_{(g)} + ½O2_{(g)}$ H=-2436000kJ², which of the following has no effect on the equilibrium position?
A. Adding argon to the system
B. Lowering the temperature
C. Adding hydrogen to the system
D. Decreasing the pressure
E. Increasing the temperature.

25. which of the following metals will displace iron from a solution of iron(11) tetraoxosulphate(1V)?
A. copper B. mercury
C. silver D. Zinc
E. Gold

26. Complete hydrogenation of ethyne yields
A. benzene B. methane
C. ethene D. propane
E. Ethane

27. Which of the following is used in the manufacture of bleaching powder?
A. sulphur dioxide B. chlorine
C. hydrogen tetraoxosulphate
D. hydrogen sulphide
E. nitrogen dioxide

28. A man suspected to being drunk is made to pass his breath into acidified potassium dichromate solution. If

has breath carries a significant level of ethanol, the final colour of the solution is.

A. Pink B. Purple
C. Orange D. Blue-black
E. Green.

29. When pollen grains are suspended in water and viewed through a microscope, they appear to be in a state of constant but erratic motion. This is due to

A. convection currents
B. small changes in pressure
C. small changes in temperature
D. a chemical reaction between the pollen grains and water
E. the bombardment of the pollen grains by molecules of water.

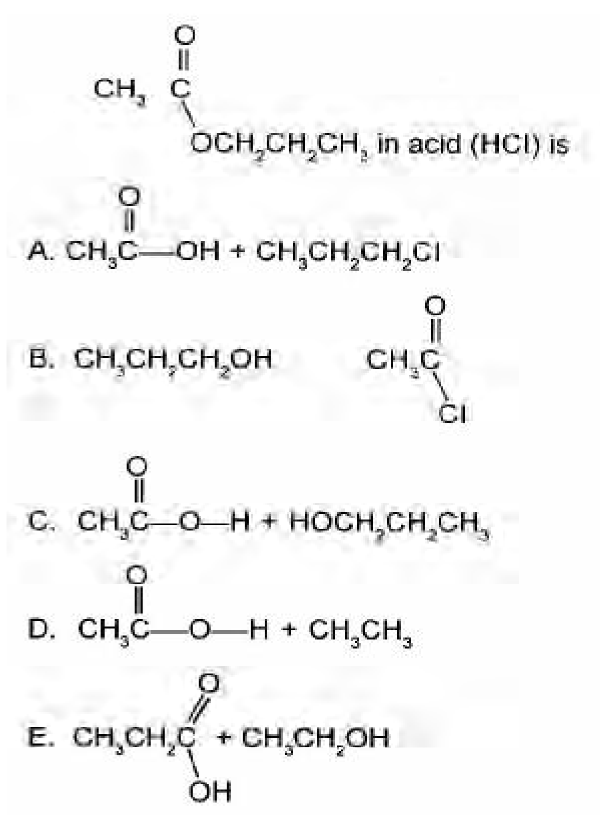
30. The energy change (H) for the reaction

$CO_{(g)} + ½O2_{(g)} \longrightarrow CO2_{(g)}$ is

A. -503.7 kJ B. +503.7 kJ
C. –282.9 kJ D. +282.9 kJ
E. +393.3 kJ

(Hi(CO) = -110.4 kJ mol^{-1}(Hi(CO_2) = -393 kJ mol^{-1}

31. The product formed on hydrolysis of



32. The neutralization reaction between NaOH solution and nitrogen (1V) oxide (NO_2) produces water and

A. $NaNO_2$ and $NaNO_3$
B. $NaNO_3$ and HNO_3
C. $NaNO_2$
D. $NaNO_3$
E. NaN_2O_3

33. The oxidation of CH- CH- C- O gives (with CH_3 on the first carbon, H on the second and third)

A. 2-butanone B. 2-butanal
C. butane D. butanoic acid
E. 3-butanal.

34. Tetraoxosulphate (V1) ions are finally tested using

A. acidified silver nitrate
B. acidified barium chloride
C. lime – water
D. dilute hydrochloric acid
E. acidified lead nitrate

35. The I.U.P.A.C name for the compound

CH_3

CH_3- CH- CH –CH = CH - CH_3 is

A. 2-methl-3-patene
B. 4-methy-2-pentane
C. 2-methl-2-penten
D. 4-methyl-3-pentene
E. 2-methyl-3-pentane

36. Mixing of aqueous solution of barium hydroxide and sodium tetraoxocarbonate(1V) yields a white precipitate of

A. barium oxide
B. sodium tetraoxocarbonate(1V)
C. sodium, oxide
D. sodium hydroxide
E. barium tetraoxocarbonate.

37. An organic compound decolorized acidified $KMnC_4$ solution but failed to react with ammoniacal silver nitrate solution. The organic compound is likely to be.

A. a carbonxyllic acicd
B. an alkane
C. an alkene
D. an alkyne
E. an alkanone

38. Solid sodium hydroxide on exposure to air absorbs a gas and ultimately gives another alkaline substance with the molecular formula.

A. $NaOH.H_2O$ B. $NaOH.N_2$
C. Na_2CO_3 D. $NaHCO_3$
E. $NaNO_3$

39. Which of the following is the functional group of carboxylic acids?

A. -OH
B. >C = O
C. >C-OH
D. -C(=O)OH
E. -C = N

40. Which of the following substances is the most abundant in the universe?
A. Carbon B. Air
C. Water D. Oxygen
E. Hydrogen

Question 41 and 42 are based on the following.
A colourless organic compound X was burnt in exces air to give two colourless and odourless grass, Y and Z , as products. X does not decolorize bomine vapour; Y turns lime milky while Z gives a blue colour with copper (11) tetraoxosulphate (V1).

41. Compound X is
A. an alkene
B. an alkane
C. an alkyne
D. tetra chloromethane
E. Dichloromethane

42. Y and Z are respectively.
A. CO_2 and NH_3 B. CO and NH_3
C. SO_2 and H_2O D. CO_2 and H_2O
E. SO_2 and NH_3

43. Which of the following compounds is NOT the correct product formed when the parent metal is heated in air?
A. Calcium oxide (CaO)
B. Sodium oxide (Na_2O)
C. Copper (11) oxide (CuO)
D. Tri-iron tetroxide (Fe_3O_4)
E. Aluminium oxide (Al_2O_3)

44. The atomic number of an element whose caution, $^{X2+,}$ has the ground state electronic configuration is $Is^2 2s^2 2P^6 3s^2 2p^6$ is
A. 16 B. 18
C. 20 D. 22
E. 24

45. When marble is heated to 1473 K, another whiter solid is obtained which reacts vigorously with water to give an alkaline solution. The solution contains
A. NaOH B. KOH
C. $Mg(OH)_2$ D. $Zn(OH)_2$
E. $Ca(OH)_2$

46. Addition of dilute hydrochloric acid to an aqueous solution of a crystalline salt yielded a yellow precipitate and a gas which turned dichromate paper green. The crystalline salt was probably
A. Na_2SO_4 B. Na_2S
C. $NaS_2O_3.5H_2O$ D. $NaCO_3$
E. $NaHCO_3$

47. The process involved in the conversion of an oil into margarine is known as
A. hydrogenation B. condensation
C. hydrolysis D. dehydration
E. cracking

48. An aqueous solution of an inorganic salt gave white precipate (i) soluble in excess aqueous NaOH (ii) insoluble in excess aqueous NH_3 (III) with dilute HCI. The caution present in the inorganic salt is
A. $NH3_4^+$ B. Ca^{++}
C. N^{++} D. Al^{+++}
E. Pb^{++}

49. Which of the following roles does sodium chloride play in soap preparation? It
A. reacts with glycerol
B. purifies the soap
C. accelerates the decomposition of the fat and oil
D. separates the soap form the glycerol
E. converts the fat acid to its sodium salt.

50. The function of sulphur during the vulcanization of rubber is to .
A. act as catalyst for the polymerization of rubber molecules
B. convert rubber from thermosetting tio thermo plastic polymer
C. from chains which bind rubber molecules together
D. break down rubber polymer molecule
E. shorten the chain length of rubber polymer.

Chemistry 1986

1. The movement of liquid molecules from the surface of the liquid gaseous phase above it is known as
A. Brownian movement
B. Condensation
C. Evaporation
D. Liquefaction

2. What mass of a divalent metal M (atomic mass= 40) would react with excess hydrochloric acid to liberate 22 cm^3 of dry hydrogen gas measured as S.T.P?
A. 8.0 g B. 4.0 g
C. 0.8 g D. 0.4 g
[G. M. V = 22.4 dm^3]

3. 10cm^3 of hydrogen fluoride gas reacts with 5cm^3 of dinitrogen difflouride gas (N_2F_2) to form 10cm^3 of a single gas. Which of the following is the most likely equation to the reaction?
A. $HF + N_2F_2 \longrightarrow N_2HF_3$
B. $2HF + N_2F_2 \longrightarrow 2NHF_2$
C. $2HF + N_2F_2 \longrightarrow N_2H2F_4$
D. $HF + 2N_2F_2 \longrightarrow N_4HF_4$

4. The number of atom chlorine present in 5.85 g of NaCI is
A. 6.02×10^{22}
B. $5.85 \times 10_{23}$
C. 6.02×10^{23}
D. 5.85×10^{24}
[Na = 23, Cl = 35.5]
Avogadro's Number = 6.02×10^{23}]

5. How much of magnesium is required to react with 250cm^3 of 0.5 M HCl?
A. 0.3 g B. 1.5 g
C. 2.4 g D. 3.0 g
[Mg = 24]

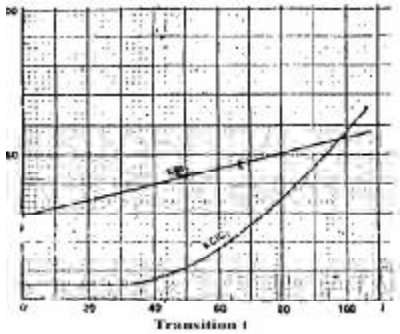
6. 200cm3 of oxygen diffuse through a porous plug in 50 seconds. Hoe long will 80 cm3 of methane (CH4) take to diffuse through the same porous plug under the same conditions?
A. 20 sec B. 20 sec
C. 14 sec D. 7 sec
[C = 12, O = 16, H = 1]

7. The relationship between the velocity (U) of gas molecules and their relative molecule mass (M) is shown by the equation
A $\hat{U} = (kM)$ ½
B. $\hat{U} = (kM)^2$
C. $\hat{U} = {}^{k}$
D $\hat{U} = ({}^{k}/_{m})$ ½

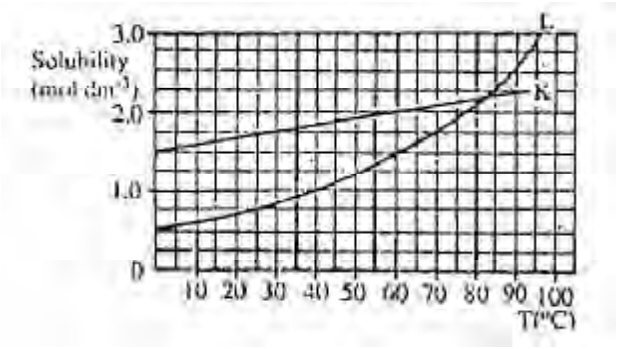
8. An element with atomic number twelve is likely to be
A. electrovalent with a valency of 1
B. electrovalent with a valency of 2
C. covalent with a valency of 2
D. covalent with a valency of 4

9. Which of the following group of physical properties increases form left to right of the periodic table? 1 lonization energy 2 Atomic radius 3Electronegativity 4 Electron affinity
A. 1 and 2 B. 1, 2 and 3
C. 3 and 4 D. 1, 2, 3 and 4

10. When 50 cm^3 of a saturated solution of sugar (molar mass 342.0 g) at 40°C was evaporated to dryness, 34.2 g dry of solid was obtained. The solubility of sugar of 40°C is
A. 10.0 moles dm^{-3} B. 7.0 moles dm^{-3}
C. 3.5 moles dm^{-3} D. 2.0 moles dm^{-3}

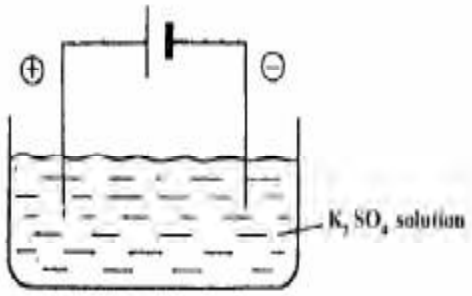
11. 

In the solubility curve above, water at 98oC is saturated with KCl impurity in the crystals formed when the solution is cooled to 30oC?
A. $NaHSO_4$, Ph<5
B. Na_2CO_3, Ph>8
C. Na_2Cl, Ph =7
D. $NaHCO_3$, Ph <6



13. Which of the following is an acid salt?
A. $NaHSO_4$ B. Na_2SO_4
C. CH_3CO_2Na D. Na_2S

14. Which of the following solution will conduct the least amount of electricity?
A. 2.00 M aqueous solution of NaOH
B. 0.01 M aqueous solution of NaOH
C. 0.01 m aqueous solution of hexaonic acid
D. 0.01 M aqueous solution of sugar.

15. 

In the electrolysis of aqueous solution of K_2SO_4 in the above cell, which species migrate to the anode?
A. SO_4^{2-} and OH- B. K^+ and SO^{2-}
C. OH and H_3O D. H_3O and K^+

16. How many coulombs of electricity are passed through a solution in which 6.5 amperes are allowed to run for 1.0 hour?
A. 3.90×10^2 coulombs
B. 5.50×10^3 coulombs
C. 6.54×10^3 coulombs
D. 2.34×10^4 coulombs

17. Which of these represents a redox reaction?
A. $AgNO_3 + NaCl \rightarrow AgCl + NNO_3$
B. $H2s + Pb(NO_3)_2 \rightarrow PbS + 2HNO_3$
C. $CaCO_3 \rightarrow CaO + CO_2$
D. $Zn + 2HCl \rightarrow ZnCI_2 + H_2$

18. How many electrons are transferred in reducing one atom of Mn in the reaction

$MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$

A. 2 B. 3
C. 4 D. 5

19. 20 cm^3 of 0.1 molar NH4OH solution when neutralized with 20.05 cm^3 of 0.1 molar HCl liberated 102 Joules of heat. Calculate the heat of neutralization of NH_4OH

A. -51.0 kJ mol^{-1} B. +57.3 kJ mol^{-1}
C. +57.0kJ mol^{-1} D. +51.0kJ mol^{-1}

20. What is the consequence of increasing pressure on the equilibrium reaction $ZnO_{(s)} + H_{2(g} \rightarrow Zn_{(s)} + H_2O_{(i)}$

A. The equilibrium is driven to the left
B. The equilibrium is driven to the right
C. There is no effect
D. More $ZnO_{(s)}$ is produced

21. The approximate volume of air containing 10cm of oxygen is

A. 20 cm^3 B. 25 cm^3
C. 50 cm^3 D. 100 cm^3

22. The reaction $Mg + H_2O \rightarrow MgO + H_2$ takes place only in the presence of

A. excess Mg ribbon
B. excess cold water
C very hot water
E. steam

23. When steam is passed through red hot carbon, which of the following are produced?

A. Hydrogen and oxygen and carbon(1V) oxide
B. Hydrogen and carbon (1V) oxide
C. Hydrogen and carbon (11) oxixde
D. Hydrogen and trioxocarbonate(1V) acid

24. Which of the following contains an efflorescent, a deliquescent and a hydroscopic substance respectively?

A. Na2SO4, concentrated H_2SO_2 $CaCl_2$
B. $Na_2CO_3.H_2O$, $FeSO_2.7H_2O$, concentrated H2SO4
C. Na_2CO_3. $10H_2O$, $FeCl_3$ concentrated H_2SO_4
D. Concentrated H_2SO_4, $FeSO_4.7H_2O$, $MgCl_2$

25. The tabulated results below were obtained by titrating 10.0 cm^3 of water with soap. The titration was repeated with the same sample of water after boiling.

	Before boiling	After boiling
Final (cm^3)	25.0	20.0
Initial (cm^3)	10.00	15.0

The ratio of permanent to temporary hardness is

A. 1:5 B. 1:4
C. 4:1 D. 5:1

26. The exhaust fumes from a garage in a place that uses petrol of high sulphur content are bound to contain

A. CO and SO_3
B. CO and SO_2
C. CO, SO_2 and SO_3
D. CO and H_2S

27. Oxygen-demanding wastes are considered to be a water pollutant because they.

A. deplete oxygen which is necessary for the survival of aquatic organisms
B. increase oxygen which is necessary for the survival of aquatic organisms
C. increase other gaseous species which are necessary for survival of aquatic organisms
D. deplete other gaseous species which are necessary for the survival of aquatic organisms.

28. Which of the following will react further with oxygen to form a higher oxide?

A. NO and H_2O
B. CO and CO_2
C. SO_2 and NO
D. CO_2 and H_2O

29. In the course of an experiment, two gases X and Y were produced. X turned wet lead ethanoate to black and Y bleached moist litmus paper. What are the elements(s) in each of the gases X and Y respectively?

A. H and S;Cl
B. H and O; Cl
C. H and S;C and O
D. H and Cl;S and O

30. Which of the following sulphides is insoluble in dilute HCl?

A. Na_2S B. ZnS
C. CuS D. FeS

31. When chlorine is passes into water and subsequently exposed to sunlight, the gas evolved is

A. HCl B. HOCl
C. O_2 D. Cl_2O_2

32. Which of the following metals does NOT form a stable trioxocarbonate(1V)

A. Fe B. Al
C. Zn D. Pb

33. Which of the following metals with NaOH to give salt and water only. When Z is treated with dilute HCl, a gas is evolved which gives a yellow suspension on passing into concentrated H_2SO_4. Substance Z is.

A. NaHS B. Na_2SO_3
C. NaS D. $NaHSO_3$

34. Ammonia gas is normally dried with

A. concentrated sulphuric acid
B. quicklime
C. anhydrous calcium chloride
D. magnesium sulphate,

35. What are the values of x, y and z respectively in the equation $xCu + yHNO_3 \longrightarrow xCu(NO_3)_2 + 4H_2O + zNO$?s
A. 4;1;2
B. 3;8;2
C. 2;8;3
D. 8;3;2

36. The iron (111) oxide impurity in bauxite can be removed by
A. fractional crystallization in acid solution
B. dissolution in sodium hydroxide and filtration
C. extraction with concentrated ammonia and reprecipitation
D. electrolysis of molten mixture.

38. A white solid suspected to be lead trioxonirate (V), zinc trioxocarbonate(1V) of calcium trioxocarbonate (1V) was heated strongly. Its residue, which was yellow when hot and white when cold, is
A. lead (11) oxide B. calcium oxide
C. zinc oxide D. lead nitrite

39. Which of the following compounds would give lilac fame coloration and a white precipitate with acidified barium chloride solution?
A. KCl B. $NaNO_3$
C. K_2SO D. $CaSO_4$

40. How will a metal X, which reacts explosively with air and with dilute acids be best extracted from its ores?
A. Electrolysis of the solution of its salt
B. Decomposition of its oxide
C. Displacement from solution by an alkali metal
D. Electrolysis of fused salt

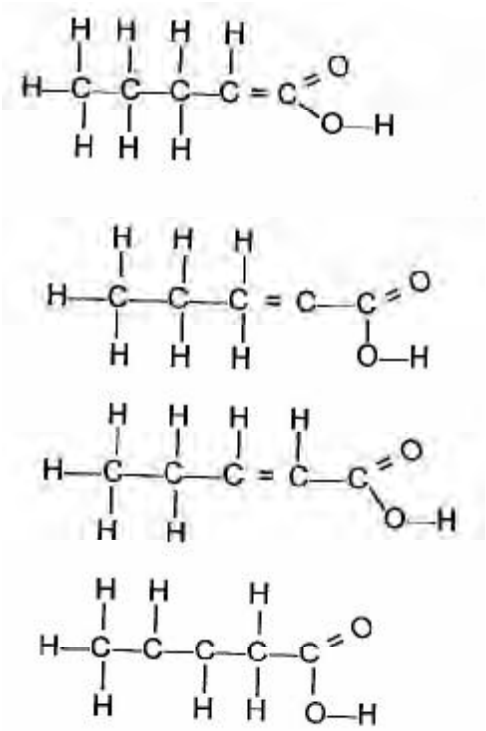
41. Which of the following is NOT correct for the named organic compound in each case?
A. Butanoic acid solution gives effervescence with Na_2CO_3 solution
B. Glucose when reacted with Na_2CrO_4 at 0°C will show immediate discharge of colour
C. When but-2-ene is reacted with dilute solution of KmnO4 the purple colour of KMnO is discharge readily even at room temperature
D. When butan-2-ol is boiled with Butanoic acid with a drop of concentrated H_2SO_4 a sweet smelling liquids is produced.

42. Which of the following is used as an'anti-knock' in automobile engines?
A. Tetramethyl silane
B. Lead tetra-ethyl
C. Glycerol
D. N-heptanes

43. What reaction takes place when palm-oil is added to potash and foams are observed?
A. Neutralization
B. Saponification
C. Etherification
D. Salting-out

44. How many isomers can be formed from organic compounds with the formula C_3H_8O?
A. 2 B. 3
C. 4 D. 5

45. Which of the structural formula for pent-2-enoic acid?



46. When ethanol is heated with excess concentrated sulphuric acid, the ethanol is
A. oxidized to ethene
B. polymerized to polyethene
C. dehydrated to ethene
D. dehydrated to ethyne.

47. Which of the following compounds is NOT formed by the action of chlorine on methane?
A. CH_3Cl B. C_2H_5Cl
C. CH_2Cl_2 D. $CHCl_3$

48. The general formula of an alkyl halide (where X represent the halide) is
A. $C_nH_{2n}\text{-}_2X$ B. $-C_nH_{2n}+_1X$
C. $C_nH_{2n}+_2X$ D. $C_nH_{2n}X$

49. Which of the following are made by the process of polymerization?
A. Nylon and soap B. Nylon and rubber
C. Soap and butane D. Margarine and Nylon

50. Starch can converted to ethyl alcohol by
A. distillation B. fermentation
C. isomerization D. cracking.

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1. A brand of link containing cobalt (11), copper (11) and irons can best be separated into its various components by.
   A. fractional crystallization
   B. fractional distillation
   C. sublimation
   D. chromatography.

2. Which of the following substances is a mixture?
   A. Granulated sugar
   B. Sea-water
   C. Sodium chloride
   D. Iron fillings

3. The number of molecules of carbon (1V) oxide produced when 10.0 g $CaCO_3$ is treated with 0.2 dm^3 of 1 M HCl in the equation $CaCO_3 + 2HCI \longrightarrow CaCl_2 + H_2O + CO_2$ is
   A. 1.00×10^{23}
   B. 6.02×10^{23}
   C. 6.02×10^{22}
   D. 6.02×10^{23}
   [Ca = 40, O = 16, C = 12, $N_A = 6.02 \times 10^{23}$, H = 1, Cl = 35.5]

4. In the reaction $CaC_{2(s)} + 2H_2O_{(1)} \longrightarrow Ca(OH_{2(s)} + C_2H_{2(g)}$ what is the mass of solid acetylene gas at S.T.P?
   A. 3.8 g B. 2.9 g
   C. 2.0 g D 1.0 g
   [C = 12, Ca –40, G.M.V = 22400 cm^3]

5. If the quality of oxygen occupying a 2.76 liter container at a pressure of 0.825 atmosphere and 300 K is reduced by one-half, what is the pressure exerted by the remaining gas?
   A. 1.650 atm B. 0.825 atm
   C. 0.413 atm D. 0.275 atm

6. Which of the following substances has the lowest vapour density?
   A. Ethanoic acid B. Propanol
   C. Dichlomethane D. Ethanal
   [O = 16, Cl = 35.5, H =1, C = 12]

7. If d represents the density of a gas and K is a constant, the rate of gaseous diffusion is related to the equation
   A. $r = \frac{k}{\sqrt{d}}$
   B. $r = kd$
   C. $r = \frac{k}{\sqrt{d}}$
   D. $r = k\sqrt{d}$

8. An isotope has an atomic number of 17 and a mass number of 36. Which of the following gives the correct number of neutrons and protons in an atom of the isotope?

	Neutrons	Protons
A.	53	17
B.	17	36
C.	19	17
D.	36	17

9. The atomic numbers of two elements X and Y are 12 and 9 respectively. The bond in the compound formed between the atoms of these two elements is.
   A. ionic B. convalent
   C. neutral D. co-ordinate.

10. An element Z, contained 90% of $^{16}_{8}Z$ and 10% of $^{18}_{8}Z$. Its relative atomic mass is
    A. 16.0 B. 16.2
    C. 17.0 D. 17.8

11. The greater the difference in electronegativity between bonded atoms, the
    A. lower the polarity of the bond
    B. higher the polarity of the bond
    C weaker the bond
    E. higher the possibility of the substance formed being a molecule.

12. A stream of air was successively passed through three tubes X, Y, and Z containing a concentrated aqueous solution of KOH, red hot copper powder and fused calcium chloride respectively. What was the composition of gas emanating from tube Z?
    A. CO_2 and the inert gases
    B. N_2, CO_2 and the inert gases
    C. N_2 and the inert gases
    D. Water vapour, N_2 and the inert gases.

13. In the purification of town water supply, alum is used principally to .
    A. kill bacteria
    B. control the pH of water
    C. improve the taste of the water
    D. coagulate small particles of mud.

14. Which of the following water samples will have the highest titer value wages titrated for the Ca^{2+} ions using soap solution?
    A. Permanently hard water after boiling
    B. Temporarily hard water after boiling
    C. Rain water stored in a glass jar for two years
    D. Permanently hard water passed through permutit

15. Oil spillage in ponds and creeks can be cleaned up by
    A. burning off the oil layer
    B. spraying with detergent
    C. dispersal with compressed air
    D. spraying with hot water.

16. The solubility of $Na_3AsO_4(H_2O)_{12}$ is 38.9 g per 100 g H2O. What is the percentage of Na_3AsO_4 in the saturated solution?
    A. 87.2% B. 38.9%
    C. 19.1% D. 13.7%
    [As = 75, Na = 23, O = 12, H= 1]

17. Which is the correct set results for tests conducted respectively on fresh lime and ethanol?

Test	Fresh lime juice	Ethanol
A. Add crystals of $NaHCO_3$	Gas evolve	No gas evolved
B. Test with methyl orange	Turns colourless	No change
C. Taste	Bitter	Sour
D. Add a piece of sodium	No gas evolved	H_2 evolved

18. In which of the following are the aqueous solutions of each of the substances correctly arranged in order of decreasing acidity?
A. Ethanoic acid, milk of magnesia, sodium chloride, hydrochloric acid and sodium hydroxide.
B. Ethanoic acid hydrochloric acid, milk of magnesiam sodium chloride and sodium, hydroxide.
C. Hydrochloric acid, ethanoid acid solution chloride, milk of magnesia and sodium hydroxide
D. Hydrochloric acid sodium hydroxide sodium chloride ethanoic acid and milk of magnesia

19. The basicity of tetraoxophosphate (v) acid is
A. 7 B. 5
C. 4 D. 3

20. If 24.83 cm^3 of 0.15 M NaOH is tritrated to its end point with 39.45 cm3 of HCl, what is the molarity of the HCl ?
A. 0.094 M B. 0.150 M
C. 0.940 M D. 1.500 M

21. A quantity of electricity liberates 3.6 g of silver from its salt. What mass of aluminium will be liberated from its salt by the same quantity of electricity?
A 2.7 g B. 1.2 g
C. 0.9 g D. 0.3 g

22. Which of the following statements is CORRECT if 1 Faraday of electricity is passed through 1 M $CuSO_4$ solution for 1 minute?
A. The pH of the solution at the cathode decreases
B. The pH of the solution at the anode decreases
C. 1 mole of Cu will be liberated at the cathode
D. 60 moles of Cu will be liberated at the anode.

23. What mass of magnesium would be obtained by passing a current of 2 amperes for 2 hrs. 30mins through molten magnesium chloride?
A. 1.12 g B. 2.00 g
C. 2.24 g D. 4.48 g
[1 faraday = 96500 coulombs, Mg = 24]

24. In the reaction of $3CuO + 2NH_3 \longrightarrow 3Cu + 3H_2O + N_2$ how many electrons are transferred for each mole to copper produced?
A. 4.0×10^{-23} B. 3.0×10^{-23}
C. 1.2×10^{24} D. 6.0×10^{24}

25. Z is a solid substance, which liberates carbon (1V) oxide on treatment with concentrated H_2SO_4, $KnnO_4$. The solid substance, Z is
.A. sodium hydrogen trioxocarbonate(1V)
B. ethanoic acid
C. iron (11) trioxocarbonate (1V)
D. ethanedioc acid (oxalic acid)

26. 5 g of ammonium trioxonirate (V) on dissolution in water cooled its surrounding water and container by 1.6kJ. What is the heat of solution of NH_4NO_3?
A. $+51.4\ kJ\ mol^{-1}$ B. $+25.6\ kJ\ mol^{-1}$
C. $+12.9\ kJ\ mol^{-1}$ D. $-6.4\ kJ\ mol^{-1}$
[N = 14, O = 16, H = 1]

27. Tetraoxosulphate (1V) acid is prepared using the chemical reaction $SO_{3(g)} + H_2O_{(1)} \longrightarrow H_2SO_{4(1)}$. Given the heat of formation for $SO_{3(g)}$, $H_2O_{(1)}$ and $H_2SO_{4(1)}$ as –395 kJ mol-1 –286 kJ mol-1 and – 811 kJ mol-1 respectively is
A. -1032 kJ B. – 130 kJ
C. +130kJ D. +1032 kJ

28. The times taken for iodine to be liberated in the reaction between sodium thisosulphate and hydrochloric acid at various temperatures are as follows:

Temp°C	25	35	45
Time (seconds)	72	36	18

These results suggest that.
A. for a 10° rise in temperature rate of reaction is doubled
B. for a 10° rise in temperature rate of reaction is halved
C. time taken for iodine to appear does not depend on temperature
D. for a 10° rise in temperature, rate of reaction is tripled.

29. The reaction between sulphur (1V) oxide and oxygen is represented by the equilibrium reaction
$2SO_{2(g} H + O_{2(g)} \longleftrightarrow 2SO_{3(g),}$ H = - 196 kJ. What factor would influence increased production $SO_{3(g)}$?
A. Addition of a suitable catalyst
B. Increase in the temperature of the reaction
C. Decrease in the temperature of $SO_{2(g)}$
D. Decrease in the concentration of $SO_{2(g)}$

30. Which of the following equations correctly represents the action of hot concentrated alkaline solution on chlorine?
A. $Cl_{2(g)} + 2OH_{(g)} \longrightarrow OCl_{(q)} + Cl_{(q)} + H_2O_{(1)}$
B. $3Cl2(g) + 6OH \longrightarrow ClO_{3(aq)} + 5Cl\ (aq) + 3H_2O_{(1)}$
C. $3CI_{2(g)} + 6OH(aq) \longrightarrow ClO_{3(s)} + 5Cl^-_{(aq)} + 3H_2O_{(1)}$
D. $3Cl2(g) + 6OH(aq) \longrightarrow 5ClO3(aq) + Cl\ (aq) + 3H2O_{(1)}$

31. Magnesium ribbon was allowed to burn inside a given gas P leaving a white solid residue Q. Addition of water to Q liberated a gas which produced dense white fumes with a drop of hydrochloric acid. The gas P was
A. nitrogen B. chlorine
C. oxygen D. sulphur (1V) oxide

32. The best treatment for a student who accidentally poured concentrated tetraoxosulphate(V1) acid on his skin in the laboratory is to wash he skin with
A. cold water
B. sodium trioxocarbondioxide solution
C. Iodine solution
D. Sodium triocarbonate (1V) solution.

33. In which of the following pairs of elements is allotropy exhibited by each element?
A. Phosphorus and hydrogen
B. Oxygen and chlorine
C. Sulphur and nitrogen
D. Oxygen and sulphur.

34. Which of the following gases can best be used for demonstrating the fountain experiment? (i) Nitrogen (ii) Ammonia (iii) Nitrogen (l)oxide (iv) Hydrogen chloride
A. (ii) and (iii) B. (i) and (iii)
C. (ii) and (iv) D. (ii) only.

35. When calcium hydroxide us heated with ammonium tetraoxosulphate (V1), the gas given off may be collected by
A. bubbling it through concentrated H_2SO_4.
B. Bubbling it through water and then passing it through calcium oxide
C. Passing it directly through calcium oxide
D. Passing it directly through calcium chloride.

36. Which of the following elements will form oxide which will dissolve both dilute HNO_3 and NaOH solution to form salts?
A. Cl B. Mg
C. Ag D. Mn

37. Stainless steel is an alloy of
A. iron, carbon and silver
B. ironm carbon and lead
C. iron, carbon and chromium
D. iron and carbon only.

38. Alloys are best prepared by.
A. high temperature are welding of the metals
B. electrolysis using the major metallic component as cathode
C. reducing a mixture of the oxides of the elements
D. cooling a molten, mixture of the necessary elements.

39. Corrosion is exhibited by.
A. iron only
B. electropositive metals
C. metals below hydrogen in the electrochemical series
D. all metals

40. Inspite of the electronic configuration, $1s^22s_2p2^2$, carbon is tetravalent because
A. the electrons in both 2s and 2p orbital have equal energy
B. the electrons in both 2s and 2p orbital are equivalent
C. both the 2s and 2p orbital hybridize
D. the six orbital hybridize to four.

41. Which of the following compounds will give a precipitate with an aqueous ammoniacal solution of copper (1) chloride?
A. $CH_3CH = CHCH_3$
B. $CH_3C{-\!\!-\!\!-}CCH_3$
C. $CH = C{-}CH_2CH_3$
D. $CH_2 = CH\text{-}CH\text{-}{=}CH_2$

42. The efficiency of petrol as a fuel in high compression inetrnal combustion engines improves with an increase in the amount of
A. Branched chain alkanes B Straight chain alkanes C. Cycloalkanes D. Halogenated hydrocarbons

43. A palm wine seller stoppered a bottle of his palm wine in his stall and after a few hours the bottle represents the reaction that occurred?
A. $C_6H_{12}O_6 \xrightarrow{enzymes} 2\,C_2H_5OH + 2CO_{2(g)}$
B. $C_2H_5OH \rightarrow CH2 = CH2(G)) + H_2O$
C. $C_2H_5OH + \text{dil } H_2SO_4 \longrightarrow C_2H_5OSO_2OH$
D. $2C_6H_{12}O_6 \rightarrow C_{12}H_{12}O_{13} + H_2O$

44. ethanol reacts with aqueous sodium mono-oxoio date(1) to gives a bright yellow solid with a characteristic smell. The products is
A. trichlomethane
B. ftriiodomethane
C. iodoethane
D. ethanal

45. The most volatile fraction obtained from fractional distillation of crude petroleum contains
A. butane propane and kerosene
B. butane propane and petrol
C. ethane, methane and benzene
D. ethane methane and propane

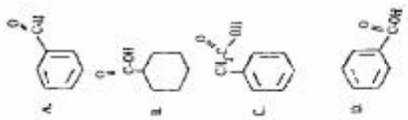
46. Local black soap is made by boiling palm with liquid extract of ash. The function of the ash is to provide the
A. acid B. ester of alkanoic acid
C. alkali D. alkanol

47. Synthetic rubber is made by polymerization of
A. 2 methyl buta-1,3-diene
B. 2 methl buta-1, 2 – diene
C. 2 methyl buta – 1-ene
D. 2 methy buta –2-ene

48. Complete oxidation of propan – 1 – of gives
A. propanal
B. propan-2-L
C. propan-1-one
D. propanoic acid

49. When water drops are added to calcium carbide in a container and the gas produced is passed called and
A. oxyethylene flame
B. oxyhydrocarbon flame
C. oxyacetylene flame
D. oxymethane flame.

50. The structure of benzoic acid is.



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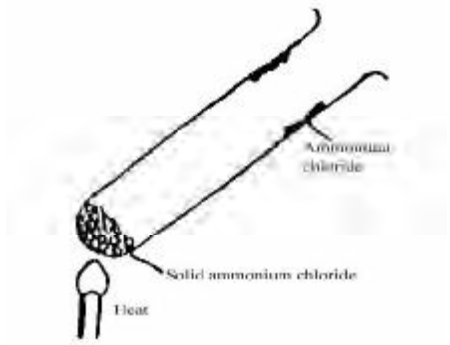


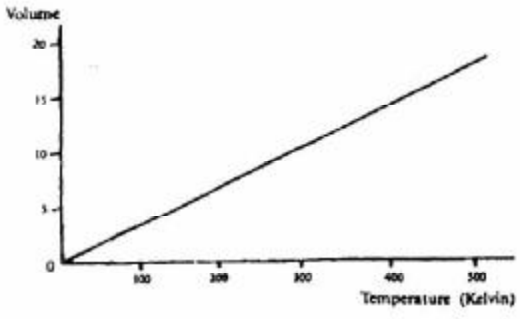
1. In the experiment above, ammonium chloride crystals deposit on the walls of the tube is as a result of
   A. Evaporation
   B. Recrystallization
   C. Sublimation
   D. Fractional precipitation.

2. The formula of the compound formed in a reaction between a trivalent metal M and a tetravalent non-metal X is.
   A. MX B. M_3X_4
   C. M_4X_3 D. M_3X_2

3. 2.25 g of sample of an oxide of a copper. 2.50 g of another oxide of Copper on reduction also gave2.0 g of copper. These results are in accordance with the law of
   A. constant composition
   B. conversation of matter
   C. multiple proportions
   D. definite proportions.

4. One role of propane is mixed with five moles of oxygen. The mixture is ignited and the propane burns completely. What is the volume of the products at soap?
   A. 112.0 dm^3 B. 67.2 dm^3
   C. 56.0 dm^3 D. 44.8 dm^3
   [G.M.V = 22.4 dm^3mol^{-1}]

5. 0.9 dm^3 of a gas at s. t. p was subjected by means of a movable piston to two times the original pressure with the temperature being now kept at 364 K. What is the volume of the gas in dm^3 at this pressure?
   A. 2.0 B. 4.5
   C. 6.0 D. 8.3

6. 

   Which of the gas laws does the above graph illustrate?
   A. Boyle B. Charles
   C. Graham D. Gay-lussac

7, An increase in temperature causes an increase in the pressure in the
   A. average velocity of the molecules
   B. number of collisions between the molecules
   C. density of the molecules
   D. free mean path between each molecules and other.

8. The forces holding naphthalene crystal together can be overcome when naphthalene is heated to a temperature of 354 K resulting in the crystals melting. These forces are known as.
   A. coulombic B. ionic
   C. covalent D. van der waals

9. A metallic ion X^{2+} with an inert gas structure contain 18 electrons. How many protons are there in this ion?
   A. 20 B. 18
   C. 16 D. 2

10. Which of the following physically properties decreases across the periodic table.
   A. Ionization potential
   B. Electron affinity
   C. Electronegativity
   D. Atomic radius

11. What are the possible oxidation numbers for an element if its atomic is 17?
   A. -1 and 7 B. – 1 and 6
   C. – 3 and 5 D. – 2 and 6

12. The energy change accompanying the addition of an electron to a gaseous atom is called
   A. first ionization energy
   B. second ionization energy
   C. electron affinity
   D. electronegativity

13. The molar ratio of oxygen to nitrogen in dissolved air is 2:1 whereas the ratio is 4:1 in atmospherics air because
   A. nitrogen is less soluble than oxygen
   B. oxygen is heavier than nitrogen
   C. nitrogen has a higher partial than pressure in air
   D. gases are hydrated in water.

14. An eruption polluted an environment with a gas suspected to H_2S, a poisonous gas. A rescue team should spray the environment with
   A. water
   B. moist SO_2
   C. acidified $KmnO_4$ and water
   D. water, acidified $KnnO_4$ and oxygen.

15. 1.34 g of hydrated sodium tetraoxosulphate (V1) was heated to give an anhydrous salt weighing 0.71g. The formula of the hydrated salt.
A. $Na_2SO_4.7H_2O$
B. $Na_2SO_4.3H_2O$
C. $Na_2SO_4.2H_2O$
D. $Na_2SO_4.H_2O$.
[Na = 23, S =32, O = 16, H=1].

16. The ion that may be assumed to have negligible concentration in a sample of water that lathers readily with soap is
A. Mg^{2+} B. K^+
C. CO^{2-}_3 D. HCO_3

17. A substance S is isomorphous with another substance R. When a tiny crystal of R,
A. S dissolves in the solution
B. Crystals of R are precipitated
C. There is no observable change
D. R and S react to the generate heat.

18. Which of the following dilute solutions has the lowest pH value?
A. Calcium trioxocarbonate(1V)
B Sodium trioxocarbonate(1V)
D. hydrochloric acid
E. ethanoic acid

19. Which of the following in aqueous solution neutralize litmus?
A. NH_4Cl B. Na_2CO_3
C. $FeCl_3$ D. NaCl.

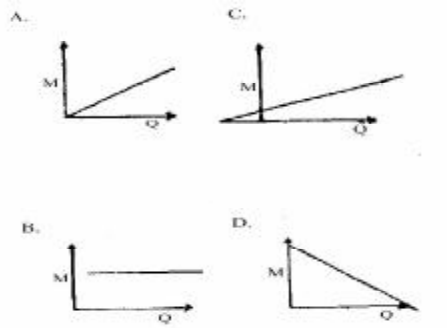
20. What volume of a 0.1 M H_3PO will be required to neutralize 45.0cm^3 of a 0.2 M NaOH?
A. 10.0 cm^3 B. 20.0 cm^3
C. 27.0 cm^3 D. 30.0cm^3

21. Which of the following substances is a basic salt?
A. Na_2CO_3 B. Mg(OH)Cl
C. $NaCHO_3$
D. $K_2SO_4.Al_2(SO_4)_3.24H_2O$.

22. Which of the following acts both as reducing and an oxidizing agent?
A. H_2 B. SO_2
C. H_2S D. C

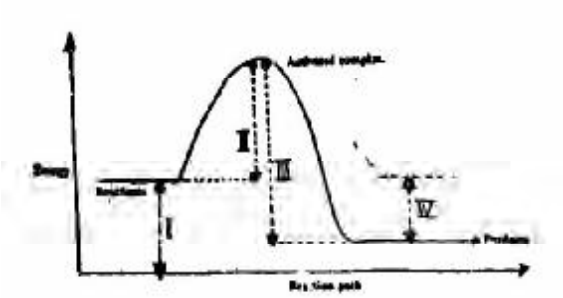
23. Which of the following reactions takes place in the cathode compartment during the electrolysis of copper (11) chloride solution?
A. $Cu^{2+}_{(aq)} + 2e \longrightarrow Cu(s)$
B. $2Cl - 2e \longrightarrow Cl_2$
C. $Cu(s) - 2e \longrightarrow Cu^{2+}_{(aq)}$
D. $Cu^{2+}_{(aq)} + 2Cl_{(aq} \longrightarrow CuCl_{2(aq)}$

24. The mass of a substance, M liberated at an electrode during electrolysis is proportional to the quantity of electricity. G passing through the electrolyte. This is represented graphically by.



25. A mixture of starch solution and potassium iodide was placed in a test tube. On adding dilute tetraoxosulphate (V1) acid and then $K_2Cr_2O_7$ solutions, a blue-black colour was produced. In this reaction, the
A. iodine ion is oxidized
B. tetraoxosulphate(V1) acid acts as an oxidizing agent
C. starch has been oxidized
D. $K_2Cr_2O_7$ is oxidized.

26.



Which of the following statements is TRUE?
A. The dissolution of $NaOH_{(s)}$ in water is endothermic
B. The heat of solution of $NaOH_{(s)}$ is positive
C. The $NaOH_{(s)}$ gains heat from the surroundings.
D. The heat of solution of $NaOH_{(s)}$ is negative.

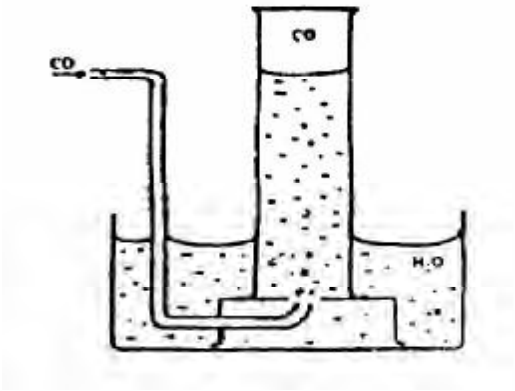
28. Which of the following will produced the greatest increase in the rate of the chemical reaction represented by the equation
$Na_2S_2O_{3(aq)} + 2HCl_{(a} \underset{q}{\longrightarrow} 2NaCl_{(aq)} + H_2O_{(1)} + SO_{2(g)} + S_{(s)}$?
A. decrease in temperature and an in increase in the concentration of the reactants
B. An increase in the temperature and a decrease in the concentration of the reactants
C. An increase in the temperature and an increase in the concentrations of the reactants
D. A decrease in the temperature and a decrease in the concentration of the reactants.

29. Which property of reversible reaction is affected by a catalyst?
A. heat content(enthalpy)
B. energy of activation
C. free energy change
D. equilibrium position.

30. Which of the following is used in fire extinguishers?
A. Carbon (11) oxide
B. Carbon (1V) oxide
C. Sulphur (1V) oxide
D. Ammonia

31. When H_2S gas is passed into a solution of iron (111) chloride, the colour changes from yellow to green. This is because.
A. H_2S is reduced to S
B. Fe^{3+} ions are oxidized by H_2S
C. H_2S ions are oxidized by Fe^{3+}
D. Fe^{3+} ions are reduced to Fe^{3+} ions

32.



Carbon (11) oxide may be collected as shown above because it
A. is heavier than air
B. is less dense than air
C. is insoluble in water
D. burns in oxygen to form carbon(1V)oxide.

33. In the reaction $C_5H_{10}O_{5(s)} \rightarrow 6C_{(s)} + 5H_2O$ concentrated H_2SO_4 is acting as
A. a reducing agent
B. an oxidizing agent
C. a dehydrating agent
D. a catalyst

34. Suitable regents for the laboratory preparation of nitrogen are
A. sodium trioxonirate (lll) and ammonium chloride
B. sodium trioxonirate(V) and ammonium chloride
C. sodium chloride and ammonium trioxonirate (V)
D. sodium chloride and ammonium trioxonirate(lll)

35. The thermal decomposition of copper (ll) trioxonirate (V) yields copper (ll) oxide, oxygen and
A. nitrogen (ll) oxide
B. nitrogen(ll) oxide
C. nitrogen (lV) oxide
D. nitrogen

36. Chlorine is produced commercially by
A. electrolysis of dilute hydrochloric acid
B. electrolysis of brine
C. neutralization of hydrogen chlorine
D. heating potassium trioxochlorate(V)

37. Which of the following is used in the manufacture of glass?
A. Sodium chlorine
B. Sodium trioxocarbonate (lV)
C. Sodium tetraoxosulphate (Vl)
D. Sodium trioxonirate (V)

38. Aluminium is extracted commercially from its ore by
A. heating aluminium oxide with coke in a furnace
B. the electrolysis of fused aluminium oxide in cryolite
C. treating cryolite with sodium hydroxide solution under pressure
D. heating sodium aluminium silicate to a high temperature.

39. Given the reactions
(i) $Fe_{(s)} + (NO3)_{2(aq)} \rightarrow Fe(NO_3)_{2(aq)} + X_{(s)}$
(ii) $H2_{(g)} + XO_{(s)} \rightarrow X_{(s)} + H_2O_{(g)}$, X is likely to be.
A. copper B. zinc
C. calcium D. lead.

40. Crude copper can be purified by the electrolysis of $CuSO4_{(aq)}$ if
A. platinum electrodes are used
B. the crude copper is made the anode of the cell
C. the crude copper is made the cathode of the cell
D. crude copper electrodes are used.

41. The IUPAC name for CH_3CH_2CHC (O; CH_3; OH)
A. 2 – methylbutanoic acid
B. 2 – methyl - -hydrosyketone
C. 2 – methyl - - hydroxyl baldheaded
D. 2 – methylpentanoic acid

43. Alkanoates are formed by the reaction of alkanoic acids with
A. alkyl halides B. alkanols
C. ethers D. sodium

44. The acidic hydrogen in the compound
1 2 3 4 5
H—C= C—CH=CH—CH_3 is the hydrogen attached to carbon number
A. 5 B. 4
C. 3 D. 2

45. The four classes of hydrocarbons are
A. ethane, ethene ethyne and benzene
B. alkanes, alkenesm alkynes and aromatics
C. alkanes, alkenes, alkynes and benzene
D. methane, ethane, propane and butane

46. Alkanes $\xrightarrow[\text{catalyst}]{400\text{-}700^{\circ}C}$ smaller alkanes + alkanes +hydrogen. The above reaction is known as
A. Photolysis B. Cracking
C. Isomerization D. Reforming.

47. In the reaction $2(C_6H_{10}O_5)\ n + nH_2O \xrightarrow{\text{diastase}} nC_{12}H_{22}O_{11}$ diastase is functioning as
A. a dehydrating agent
B. a reducing agent
C. an oxidizing agent
D. a catalyst.

48. 48. which of the following compounds has the highest boiling point?
A. $CH_3\ CH_2\ CH_2\ CH_2\ OH$
B. $CH_3 CH_2 CH_2 CHO$
C. $CH_3\ CH2\ CH_2\ CH_3$
D. $CH_3\ CH_2\ OCH_2\ CH_2$

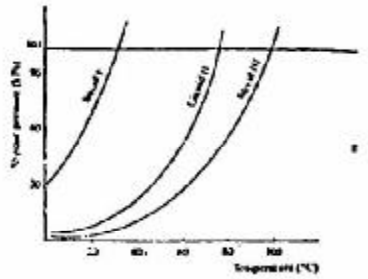
49. Detergents have the general formula
A. $R(CH_2)NOH$
B. $RSO_3\ Na+$
C. $RCO_2\ Na+$
D. RCO_2H

50. What process would coal undergo to give coal gas, coal tar, ammoniac liquor and coke?
A. steam distillation
B. Destructive distillation
C. Liquefaction,
D. Hydrolysis.

Chemistry 1989

1. Which of the following would support the conclusion that a solid sample is mixture?
A. The solid can be ground to a fine powder
B. The density of the solid is 2.25 g dm^3
C. The solid has a melting range of 300°C to 375°C.
D. The solid of the moisture from the atmosphere.

2. The molar of carbon to hydrogen of volatile liquid compound is 1:2. 0.12 g of the liquid evaporation at s.t.p gave 32 cm3 of vapour. The molecular formula of the liquids is
A. C_3H_6 B. C_4H_8
C C_5H_{10} D. C_6H_{12}
[G.M.V = 22.4 DM3, C=12, H=1]

3. 

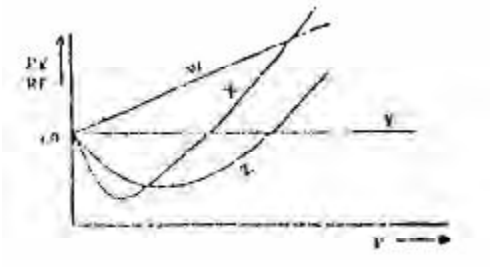
It can be deduced from the vapour of pressure curves above that.
A. liquid has the highest boiling point
B. liquid has the highest boiling point
C. liquid lll has the highest boiling point
D. liquid lll has the lowest boiling point.

4. 20.00 cm3 of a solution containing 0.53 g of anhydrous Na_2CO_3 in 100 cm3 requires 25.00 cm3 of H_2SO_4 for complete neutralization. The concentration of the acid solution in moles per dm3 is
A. 0.02 B 0.04
C 0.06 D. 0.08
[H= 1, C = 12, 0 = 16, Na = 23 , S =32]

5. The minimum volume of oxygen required for the complete combustion of mixture of 10cm3 of CO and 15 cm3 of H_2 is
A. 25.0 cm^3
B 12.5 cm^3
C 10.0 cm^3
D 5.0 cm^3

6. What is the partial pressure of hydrogen gas collected over water at standard atmospheric pressure and 25oC if the saturation vapour pressure of water is 23 mm Hg at that temperature?.
A. 737 mm Hg B. 763 mm Hg
C. 777 mm Hg D. 737 mm Hg

7. The atomic radius Li, Na and K are 1:33 A m 1.54A and 1.96A respectively. Which of the following explain this gradation in atomic radius?
A. Electropositivity decreases from Li to Na to K
B. Electronegativity decreases from Li to Na to K.
C. The number of electron shells increase from Li to Ma to K
D. The elements are in the same period.

8. 

Which of the curves in the above graph illustrates the behaviors of an ideal gas?
A. W B. X
C. Y D. Z

9. Elements X and Y have electronic configurations $1s^2 2s^2 2p^4$ and $1s^2 2s^2 2p^6 3s^2 3p^1$ respectively. When they combine, the formula of the compound formed is

A. XY B. YX
C. X_2Y_3 D. Y_2X_3

10. The atomic number of cesium is 55 and its atomic mass is 133. The nucleus of cesium atom therefore contains

A. 78 protons and 55 electrons
B. 55 protons and 78 neutrons
C. 55 neutrons and 78 electrons
D. 78 neutron and 55 neutrons

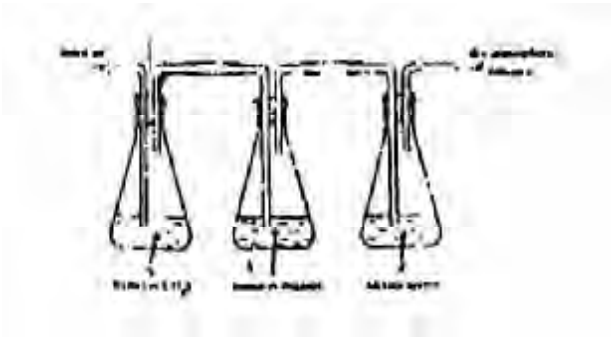
11. Four elements P,Q,R and S have atomic numbers of 4, 10, 12, and 14 respectively. Which of these elements is a noble gas?

A. P B. Q
C. R D. S

12. How many valence electrons are contained in the element represented by $^{31}_{15}P$?

A. 3 B. 5
C. 15 D. 31

13.



In the above set up, substances X and Y are respectively.

A. Lime water and copper (ll) tetraoxosulphate (Vl)
B. Potassium trioxocarbonate(lV) and alkaline prygallol
C. Potassium hydroxide and alkaline pyrogallo
D. Potassium trioxocarbonate (lV) and concerntrate tetraoxosulphate (Vl) aid

14. The gaseous pollutant sulphur (lV) oxide is most likely to be detected in fairly reasonable quantities in the area around a plant for the

A. extraction of aluminium from bauxite
B. production of margarine
C. smelting of copper
D. production of chlorine from brine

15. Calcium hydroxide is added in the treatment of town water supply to

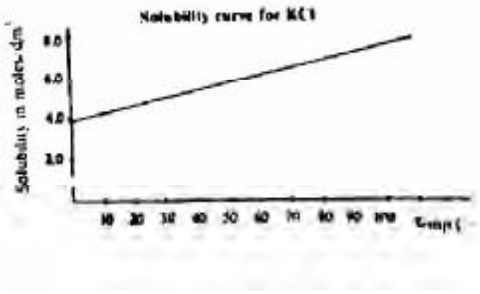
A. kill bacteria in the water
B. facilitate coagulation of organic particles
C. facilitate sedimentation
D. improve the tase of the water.

16. A hydrated salt of formula $MSO_4.XH_2O$ contains 45.3% by mass of the water of crystallization.
Calculate the value of X.

A. 3 B. 5
C. 7 D. 10

[M = 56, S= 32, O =16, H= 1]

17



If the graph above 1 dm^3 of a saturated solution of HCI is cooled from 80°C, the mass of crystals deposited will be.

A. 7.45 g B. 14.90 g
C. 74.50 g D. 149.00 g

[K = 39, Cl= 35.5]

18. Using 50cm3 of 1 M potassium hydroxide and 100cm3 of 1M tetraoxosulphate(Vl) acid, calculate the respective volumes in cm3 of bade and acid 100 cm3 of base and acid that would be required to produce the maximum amount of potassium tetraoxosulphate(Vl)

A. 50,50 B. 25,50
C. 50,25 D. 25,25

[K = 39, S= 32, O = 16, H = 1]

19. A solution of calcium bromide contains 20 g dm^3
What is the molarity of the solution with respect to calcium bromide and bromide ions?

A. 0.1,0.1 B. 0.1,0.2
C. 0.1,0.05 D. 0.05,0.1

[Ca = 40, Br = 80]

20. The substance of ZnO dissolves in sodium hydroxide solution and mineral acid solution to gives soluble products in each case. ZnO is therefore referred to as.

A. an allotropic acid
B. an atmopheric oxide
C. a peroxide
D. a dioxide.

21. An acid its conjugate base .

A. can neutralize each other to form a salt
B. differ only by a proton
C. differ only by the opposite charges they carry
D. are always neutral substances

22. The same current is passed for the same time through solutions of AgNO3 and CuSO4 connected in series. How much silver will be deposited if 1.0 g of copper is produced?

A. 1.7 g B. 3.4 g
C. 6.8 g D. 13. 6 g

[Cu = 63.5, S = 32, O = 16M Ag = 108, N = 14]

23. What is discharged at the cathode during the electrolysis of copper (ll) tetraoxosulphate (Vl) solution?

A. Cu^{2+} only B. H+ only
C. Cu_{2+} and H^+ D. Cu^{2+} and SO^{2-}

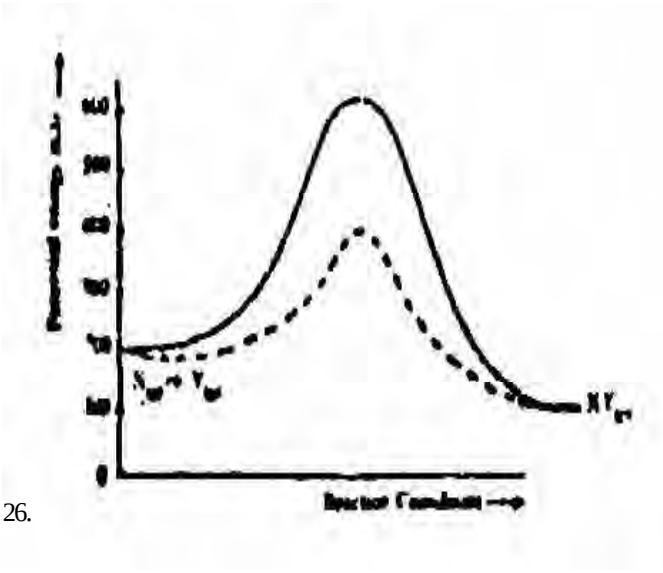
24. An element, Z forms an anion whose formula is $[Z(CN)_6]^y$. If has an oxidation number of +2, what is the value of y?

A. -2 B. –3
C. –4 D. –5

25. Which of the reaction is NOT an example of a redox reaction?

I $Fe + 2Ag^+ \longrightarrow Fe^{2+} + 2Ag+$
II $2H_2S + SO_2 \longrightarrow 2H_2O + 3S$
III $N_2 + O \rightleftharpoons 2NO$
IV $CaCO_3 \rightleftharpoons CaO + CO_2$

A. I, II, III B. II and III
C. III and IV D. IV only.

26. 

The above diagram gives the potential energy profile of the catalyzed uncatalysed reactions of $X(g) + Y(g) \longrightarrow XY(g)$. Deduce the respective activation energies in kJ of the catalyzed and uncatalysed reverse reactions.

$XY(g) + X(g) \longrightarrow X(g) + Y(g)$

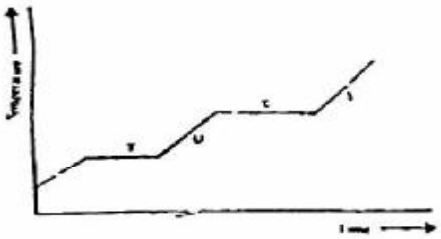
A. 300, 500 B. 500, 300
C. –300, -500 D. –5000.

27. The combustion of ethene, C2H2, is given by the equation $C_2H_4 \longrightarrow 2CO_2 + 2H_2O$; H = -1428 kJ. If the molar heats of formation of water and carbon (l) oxide are –286kJ and –396 kJ respectively. Calculate the molar heat of formation of ethane in kJ.

A. -2792 B. +2792
C. –64 D. +64

28. $CO(g) + H_2O \rightleftharpoons CO_2(g) + H2(g)$ H = -41000 J. Which of the following factors favour the formation of hydrogen in the above reaction? I high pressure II low pressure III high temperature IV use of excess steam

A. I, III, and IV B. III only
C. II, III and I D. Iv only.

29. 

The above graph shows a typical heating curve from the solid phase through the liquid phase to the gaseous phase of a substance . What part of the curve shows solid and liquid in equilibrium?

A. T B. U
C. X D. Y

30. Which of the following represents the balanced equation for the reaction of copper with concentrated trioxonirate (V) acid?

A. $2NHO_{3(aq)} \longrightarrow Cu(NO_3)_{2(aq)} + H_{2(g)}$
B. $Cu_{(s)} + 4HNO_3 \longrightarrow Cu(NO_3)_{2(aq)} + 2H_2O_{(l)} + 2NO_{2(g)}$
C. $3Cu_{(s)} + 8HNO_{3(aq)} \longrightarrow 3Cu(NO_3)_{2(aq)} + 4H_2O_{(l)} + 2NO_{(g)}$
D. $3Cu_{(s)} + 4\ HNO_{3aq} \longrightarrow 3Cu(NO_3)_{2(aq)} + 2H_2O_{(l)} + 2NO(g)$.

31. The catalyst used in the contact process for the manufacture of tetraoxosulphate(Vl) acid is

A. Manganese (lV) oxide
B. Manganese (ll) tetraoxosulphate (lV)
C. Vanadium (V) oxide
D. Iron metal

32. Some products of destructive distillation of coal are

A. carbon (iV) oxide and ethanoic acid
B. trioxocarbonate (lV) acid and methanoic acid
C. producer gas and water gas
D. coke and ammonia liquor

33. Gunpowder is made from charcoal, sulphur and potassium trioxonirate (V). The salt in the mixture performs the function of

A. an oxidant B. a reductant
C. a solvent D. a catalyst

34. Which of the following reaction is (are) feasible?

l $Br_{(2l)} + 2Cl_{(aq} \rightleftarrows 2Br_{(aq)} + Cl2_{(aq}$

ll $21_{(aq)} + Br_{2(1)} \rightleftarrows 2Br_{(aq)} + l2_{(s)}$

lll $2F(aq) + Cl2_{(aq} \rightleftarrows 2Cl(aq) + F_{2(g)}$

lV $2F_{(ag)} + Br_{2(1)} \rightleftarrows 2Br_{(aq)} + F_{2(g)}$

A l B. ll

C I and lll D. lll and lV

35. Bleaching powder, CaOCl2.H2O, deteriorates on exposure to air because

A. it loses its water of crystallization

B. atmospheric nitrogen displaces chlorine from it

C. carbon (lV) oxide of the atmosphere displaces chlorine from it

D. bleaching agents should be stored in solution

36. The product of the thermal decomposition of ammonium trioxonirate (V) are.

A. NO_2 and oxygen

B. NH_3 and oxygen

C. nitrogen and water

D. N_2O and water.

37. The scale of a chemical balance is made of iron plate and coated with copper electrolytically because.

A. iron is less susceptible to corrosion than copper

B. copper is less susceptible corrosion as ion

C. copper is less susceptible to corrosion than ion

D. copper and ion are equally susceptible to corrosion.

38. A metal is extracted for, its ore by the electrolysis of tits molten chlorine and it displace lead from lead (ll) trioxonirate(V) solution. The metal is

A. copper B. aluminium

C. zinc D. sodium

39. Mortar is NOT used for under-water construction because.

A. It hardens by loss of water

B. Its hardening does not depent upon evaporation

D. It requires concrete to harden

E. It will be washed away by the flow of water.

40. Which of the following is NOT involved in the extraction of metals from their ores?

A. reduction with carbon

B. reduction with other metals

C. reduction by electrolysis

D. oxidation with oxidizing agent.

41 Which of the following compounds is an isomer of the compound.

A. $CH\text{-}CH_2\text{-}\underset{CH_3}{CH}\text{-}CH_2\text{-}CH_3$ B. $CH\text{-}CH_2\text{-}\underset{C_2H_5}{CH}\text{-}CH_2\text{-}CH_3$

C. $CH\text{-}CH_2\text{-}\underset{C_2H_5}{CH}\text{-}CH_3$ D. $CH_3\text{-}\underset{CH_3}{CH}\text{-}CH_2\text{-}CH_3$

42. When excess chlorine is mixed with ethene at room temperature, the product is

A. 1,2 – dichloroethane

B. 1,2 – dichloroethene

C. 1, 1- dichloroethane

D. 1, 1- dichloroethene.

43. Vulcanization of rubber is a process by which

A. Isoprene units are joined to produce rubber

B. Rubber latex is coagulated

C. Sulphur is chemically combined in the rubber

D. Water is removed from the rubber.

44. The reaction between ethanoic acid and sodium hydroxide is an example of

A. esterification B. neutralization

C. hydrosylation D. hydrolysis

45. The bond which joins two ethanoic acid molecules in the liquid state is

A. a covalent bond

B. an ionic bond

C. a dative covalent bond

D. a hydrogen bond

46. The alkaline hydrolysis of fats and oils produces soap and

A. propane 1, 1, 3-triol

B. propane – 1, 3, 3-triol

C. propane-1-2-2-triol

D. propane-1-2-3-triol

47. which of the following is NOT a monomer?

A. 

B. $CH_2 = CH_2$

D. $CH_2 = CHCl$

48. What is the IUPAC name for the compound

$$CH_2 = \underset{CH_2CI}{\overset{CH_3}{C}}$$

A. 1-chloro-2-methylprop-2, 3-ene

B. 1-chloro-2-methlprop-2-ene

C. 3-chloro-2-methylprop-1-ene

D. 3-chloro-2-methyprop-1,2-ene

49. The gas responsible for most of the fatal explosion in coal mines is

A. butane B. ethene

C. ethane D. methane

50. Three liquids X,Y and Z containing only hydrogen and carbon were burnt on a spoon, X and Y burnt with sooty flames while Z did not. Y is able to discharge the colour of bromine water whereas X and Z cannot. Which of the liquids would be aromatic in nature?

A. X and Z B. Y
C. X D. Z

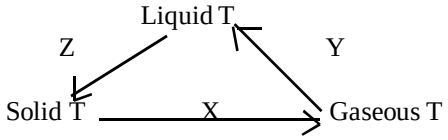
Chemistry 1990

[G.M.V at s.t.p = 22.40 dm^3]

1. Which of the following is a physical change?

A. The bubbling of chlorine into water
B. The bubbling of chlorine into jar containing hydrogen
C. The dissolution of sodium chlorine in water
D. The passing of steam over heated iron.

2. Changes in the physical states of chemical substances T are shown in the scheme below.



The letters X, Y and Z respectively represent

A. sublimation, condensation and freezing
B. sublimation, vaporization and solidification
C. freezing, condensation and sublimation
D. evaporation, liquefaction and sublimation.

3. In the reaction: $SnO_2 + 2C \rightarrow Sn + 2CO$ the mass of coke containing 80% carbon required to reduce 0.032 kg of pure tin oxide is

A. 0.40 kg B. 0.20 kg
C. 0.06 kg D. 0.40 g
[Sn = 119, O = 16, C = 12]

4. The Avogadro's number of 24 of magnesium is same as that of

A. 1 g of hydrogen molecules
B. 16 g of oxygen molecules
C. 32 g of oxygen molecules
D. 35.5 of chlorine molecules.

5. If a gas occupies a container of volume 146 cm3 at 18°C and 0.971 atm, its volume on cm3 at s.t.p is

A. 133 B. 146
C. 266 D. 292

6. The volume occupied by 1.58 g of gas s.t.p is 500 cm^3. What is the relative molecule mass of the gas?

A. 28 B. 32
C. 344 D. 71

7. Equal volumes of CO, SO_2 NO_2 and H_2S, were released into a room at the same point and time. Which of the following gives the order of the room?

A. CO_2, SO_2, NO, H_2S,
B. SO_2, NO_2, H_2S, CO
C. CO, H_2S, SO_2, NO_2
D. CO, H_2S, NO_2, SO_2
[S = 32, C=12, 0=16, N = 14, H =1]

8. A basic postulate of the kinetic theory of gases is that the molecules of a gas move in straight lines between collisions. This implies that.

A. collisions are perfectly elastics
B. forces of repulsion exist
C. forces of repulsion and attraction are in equilibrium
D. collisions are inelastic.

9.

	P	Q	R	S
Proton	13	16	17	19
Electron	13	16	17	19
Neutron	14	16	35	20

Which of the four atoms P,Q,R and S in the above data can be described by the following properties: relative atomic mass is greater than 30 but less than 40 ; it has an odd atomic number and forms a unipositive ion in solution?

A. P B. Q
C. R D. S

10. Which of the following terms indicates the number of bonds that can be formed by atom?

A. Oxidation number
B. Valence
C. Atomic number
D. Electronegativity.

11. $X_{(g)} \rightarrow X_{(g)}$. The type of energy involved in the above transformation is

A. ionization energy
B. sublimation energy
C. lattice energy
D. electron affinity

12. Chlorine, consisting of two isotope of mass numbers 35 and 37, has an atomic of 35.5. The relative abundance of the isotope of mass number 37 is.
A. 20 B. 25
C. 50 D. 75

13. 10.0 dm^3 of air containing H_2S as an Impurity was passed through a solution of $Pb(NO_3)_2$ until all the H2S had reacted. The precipitate of PbS was found weight 5.02 g. According to the equation: $Pb(NO_3)_2$ + H2O '! PbS "!+2HNO3 the percentage by volume of hydrogen sulphides in the air is.
A. 50.2 B. 47.0
C. 4.70 D. 0.47
[Pb = 207, S = 23, GMV at s.t.p = 22.4 dm_3]

14. A blue solid, T, which weighted 5.0 g was placed on a table. After 8 hours, the resulting pink sold was found to weight 5.5 g. It can be inferred that substance T
A. is deliquescent
B. is hydroscopic
C. has some molecules of water of crystallization
D. is efflorescent

15. The effluent of an industrial plant used ins the electrolysis of concentrated brine, with a flowing mercury cathode may contain impurities like.
A. oxygen
B. hydrogen
C. mercury (ll) chloride
D. hydrogen chloride

16. The solubility in moles per dm^3 of 20 g of $CuSO_4$ dissolved in 100 g of water at 180°C is
A. 0.13 B. 0.25
C. 1.25 D. 2.00
[Cu = 63.5, S = 32, O = 16]

17. Smoke consists of
A. solid particles dispersed in liquid
B. solid or liquid particles dispersed in gas
C. gas or liquid particles dispersed in liquid
D. liquid particles dispersed in liquid.

18. NaC_2O_4 + CaCl ⟶ CaC_2O_4 + 2NaCl. Given a solution of 1.9 g of sodium oxalate in 50 g of water at room temperature, calculate the minimum volume of 0.1 M calcium oxalate required to produce maximum calcium oxalate using the above equation.
A. 1.40×10^2 dm^3
B. 1.40×10^2 cm^3
C. 1.40×10^{-2} dm^3
D. 1.40×10^{-2} cm^3

19. 2.0 g of monobasic acid was made up to 250 cm^3 with distilled water. 25.00 cm^3 of this solution required 20.00 cm^3 of 0.1 M NaOH solution for complete neutralization. The molar mass of the acid is
A. 200 g B. 160 g
C. 100 g D. 50 g

20. What is concentration of H^+ ions in moles per dm^3 of a solution of pH 4.398?
A. 4.0×10^{-5} B. 0.4×10^{-5}
C. 4.0×10^{-3} D. 0.4×10^{-3}

21. What volume of 11.0 M hydrochloric acid must be dilute to obtain 1 dm^3 of 0.05 M acid?
A. 0.05 dm^3 B. 0.10 dm^3
C. 0.55 dm^3 D. 11.0 dm^3

22. If 10.8 g of silver is deposited in a silver coulometer connected in series with a copper coulometer, the volume of oxygen liberated is
A. 0.56 dm^3 B. 5.50 dm^3
C. 11.20 dm^3 D. 22.40 dm^3
[Ag = 108, Cu = 64, GMV at s.t.p = 22.40 dm^3].

23. 0.1 faraday of electricity deposited 2.95 g of nickel during electrolysis is an aqueous solution. Calculate the number of moles of nickel that will Be deposited by 0.4 faraday
A. 0.20 B. 0.30
C. 0.034 D. 5.87
[Ni = 58.7]

24. $Cr2O_7^{2-} + 6Fe^{2+} + 14H^+ \longrightarrow 2Cr^{3+} + 6Fe^{3+} + 7H_2O$. In the above chromium change from.
A. +7 to +3 B. +6 to +3
C. +5 to +3 D. –2 to+3

25. In the reaction $10^-_3 + 51^- + 6H^+ \longrightarrow 31_2 + 3H_2O$, the oxidizing agent is
A. H^+ B. 1^-
C. 10^-_3 D. 1_2

26. $Fe_2O_{3(s)} + 2Al \longrightarrow Al_2O_3 + 2Fe_{(s)}$ are –1670 kJ mol-1 and –822kJ mol-1 respectively, the enthalpy change in kJ for the reason is
A. +2492 B. +848
C. –848 D. –2492

27. Iron galvanized with zinc catholically protected from corrosion. This is because
A. zinc has a more positive oxidation potential than iron
B. zinc has a less positive oxidation potential than iron
C. both have the same oxidation potential
D. zinc is harder than iron.

28. Which of the following samples will react faster with dilute dtrioxonitrate (V) acid?
A. 5 g of lumps of $CaCO_3$ at 25°C
B. 5 g of powered $CaCO_3$ at 25°C
C. 5 g of lumps of $CaCO_3$ at 50°C
D. 5 g of powered $CaCO_3$ at 50°C

29. In the reaction ,
$2HI_{(g)} \longrightarrow H_{2(g)} + I_2(g)$, $\triangle H = 10$ kJ;
the concentration of iodine in the equilibrium mixture can be increased by
A. raising the pressure

B. raising the temperature
C. adding the temperature
D. lowering the pressure

30. Which of the following gases can be collected by upward displacement of air?
A. NO B. H_2
C. NH_3 D. Cl_2

31. The brown fumes given off when trioxonirate (V) acid consist of
A. NO_2 and O_2 B. H_2O and NO_2
C. NO_2, O_2 and H_2O D. NO_2 and H_2O

32. Which of the following tests will completely identify any one of sulphur (lV) oxide, hydrogen, carbon (lV) oxide and nitrogen (ll) oxixde?
A. pass each gas into water and test with blue litmus pare
B. pass each gas into lime water
C. expose each gas to atmospheric air
D. passs each gas to concentrated tetraoxosulphate(Vl) acid.

33. In the Haber process for the manufacture of ammonia, the catalyst commonly used is finely divided.
A. vanadium B. platinum
C. iron D. copper

34. A metallic oxide which reacts with both HCl and NaOH to give salt and water only can be classified as
A. an acidic oxide
B. an atmospheric oxide
C. a neutral oxide
D. an atmospheric oxide

35. Which of the following metals will liberate hydrogen form steam or dilute acid?
A. copper B. iron
C. lead D. mercury

36. Coal fire should not be used in poorly ventilated rooms because
A. of the accumulation of CO_2 which cause deep sleep
B. it is usually too hot
C. of the accumulation of CO which causes suffocation
D. it removes most of the gases in the room

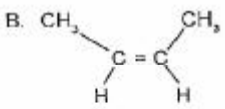
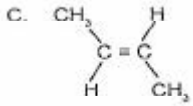
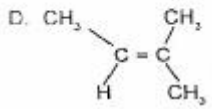
37. The major component of the slag from the production of iron is
A. an alloy of calcium and iron
B. coke
C. impure ion
E. calcium trioxosilicate (V)

38. Sodium hydroxide should be stored in properly closed containers because it
A. readily absorbs water vapour from the air
B. is easily oxidized by atmospheric oxygen
C. turns golden yellow when exposed to light.
D. Melts at a low temperature.

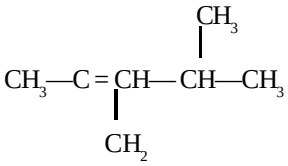
39. To make coloured glasses, small quantities of oxides of metals which form coloured silicates are often added to the reaction mixture consisting of Na_2CO_3 and SO_2. Such a metal is
A. potassium B. barium
C. zinc D. copper

40. Which of the following compounds gives a yellow residue when heated and also reacts with aqueous sodium hydroxide to give a white gelatinous precipitate soluble in excess sodium hydroxide solution.
A. $(NH_4)_2CO_3$ B. $ZnCO_3$
C. $Al_2(SO_4)_3$ D. $PbCO_3$

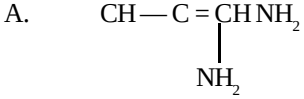
41. A cycloalkane with molecular formula C_5H_{10} has
A. one isomer B. two isomers
C. three isomers D. four isomers

42. The structure of cis-2butene is
A. CH_3-CH=CH-CH_3
-
B. 
C. 
D. 

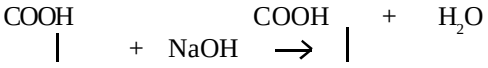
43. What is the IUPAC name for the hydrocarbon



A. 2-ethyl-4-methylpent-2-ene
B. 3,5-dimenthylhex-3-ene
C. 2,4-dimenthylhex-3-ene
D. 2-methyl-4-ethylpent-3-ene

44. $CH_3 \equiv CH \longrightarrow$ P. Compound P, in the above reaction, is.
A. 
B. $CH_3 - C \equiv CH\ Na$
C. $CH_3 - C \equiv C - Na$
D. $CH3 - C \equiv C - NH_2$

45. The label on a reagent bottle containing a clear organic liquid dropped off. The liquid was neutral to litmus and gave a colourless gas with metallic sodium. The liquid must be an
A. alkanoate B. alkene
C. alkanol D. alkane

46. 

The above reaction is an example of

A. displacement reaction
B. a neutralization reaction
C. an elimination reaction
D. Saponification

47. Alkanoic acids have low volatility compared with Alkanoic because they

A. are more polar than alkanols
B have two oxygen atoms while alkanols have one
C. form two hydrogen bonds while alkanols donot
D. form two hydrogen bonds while alkanols form one.

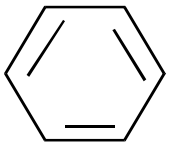
48. The octane number of a fuel whose performance is the same as that of a mixture of 55 g of 2, 2, 4-trimethyl pentane and 45 g of n-heptanes is

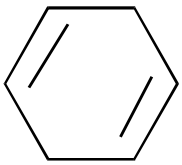
A. 45 B. 55
C. 80 D. 100

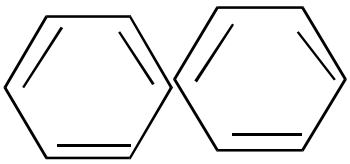
49. Which of the following is formed when maltose reacts with concentrated tetraoxosulphate (Vl) acid.

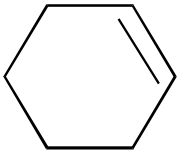
A. Carbon (lV) oxixde
B. Coal tar
C. Charcoal
D. Toxic fumes

50. Which of the following compounds represents the polymerization product of ethyne?

A.. 

B. 

C. 

D. 

Chemistry 1991

1. Which of the following can be obtained by fraction of distillation?

A. Nitrogen from liquid air
B. Sodium chloride for sea water
C. Iodine from a solution of iodine in carbon tetrachloride
D. Sulphur from a solution of sulphur in carbon disulphide.

2. Which of the following are mixture? I Petroleum ii Rubber latex. Iii Vulcanizes' solution. Iv Carbon (ll) sulphides

A. I, ii and iii
B. I, ii and iv
C. I and ii only
D. I and iv

3. An iron ore is known to contain 70.0% Fe_2O_3. The mass of iron metal which can theorically be obtained from 80kg of the ore is.

A. 35.0 kg B. 39.2 kg
C. 70.0 kg D. 78.4 kg

[Fe = 356, O = 16]

4. In two separate experiments 0.36 g and 0.71 g of chlorine combine with a metal X to give Y and Z respectively. An analysis showed that Y and Z contain 0.20 g and 0.40 g of X respectively. The data above represents the law of .

A. multiple proportion
B. conversation of mass
C. constant composition
D. reciprocal proportion.

5. 30cm^3 of oxygen at 10 atmosphere pressure is placed in a 20 dm^3 container. Calculate the new pressure it temperature is kept constant.

A. 6.7 atm B. 15.0 atm
C. 6.0 atm D. 66.0 atm

6. A given quantity of gas occupies a volume of 228 cm^3 at a pressure of 750 mm Hg. What will be its volume at atmospheric pressure?

A. 200cm^3 B. 225 cm^3
C. 230 cm^3 D. 235 cm^3

7. Calculate the volume of carbon (lv) oxide measure at s.t.p, produced when 1 kg of potassium hydrogen trioxocarbonate (iV) is totally decomposed by heat.
A. $28\ dm^3$ B. $56\ dm^3$
C. $112\ dm^3$ D. $196\ dm^3$
[G.M.V at s.t.p = 22.4 dm^3, K = 39, O = 16, C = 12, H = 1]

8. A sample of a gas exerts a pressure of 8.2 atm when confined in a 2.93dm^3 container at 20°C. The number of moles of gas in the sample is
A. 1.00 B. 2.00
C. 3.00 D. 4.00
[R= 0.082 litre atm/deg mole]

9. Atoms of element X (with 2 electrons in the outer shell) combine with atoms of Y(with 7 electrons in the outer shell). Which of the following is FALSE? The compound formed
A. has formula XY
B. is likely to be ionic
C. contains X^{2+} ions
D. contains Y^- ions

10. The ions X^- and Y^+ are isoelectronic, each containing a total of 10 electrons. How many proteins are in the nuclei of the neutral atoms of X and Y respectively?
A. 10 and 10 B. 9 and 9
C. 11 and 9 D. 9 and 11

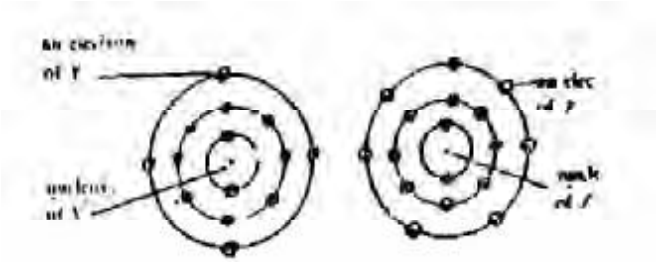
11. The electronic configuration of an element is $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^3$. How many unpaired electron are there in the element.
A. 5 B. 4
C. 3 D. 2

12. Which of the following represents the type of bonding present in ammonium chloride molecule?
A. Ionic only
B. Covalent only
C. Ionic and dative covalent
D. Dative covalent only.

13. Which of the following is arranged in order of increasing electronegativity?
A. Chlorine, aluminium, magnesium, phosphorus, sodium.
B. Sodium, magnesium, aluminium phosphorus, chlorine
C. Chlorine, phosphorus, aluminium, magnesium, sodium.
D. Sodium, chlorine, phosphorus, magnesium, aluminium.

14. A quantity of air was passed through a weighed mount of alkaline pyrogallol. An increase in the weight of the pyrogallol would result from the absorption of.
A. nitrogen B. neon
C. argon D. oxygen.

15.



The electrons of two atoms of Y and Z are arranged in shells as shown above. The bond formed between the atoms of Y and Z is
A. ionic
B. covalent
C. dative
D. metallic.

16. Which of the following ionsis a pollutant in drinking water even in trace amount?
A. Ca^{2+}
B. Hg^{2+}
C. Mg^{2+}
D. Fe^{2+}

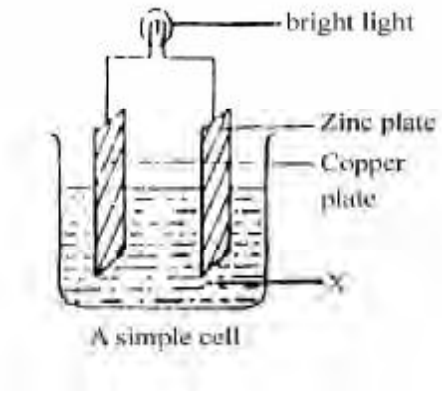
17. The solubility of copper (ll) tetraoxosulphate (Vl) is 75 g in 100 g of water at 100°C and 25 g in 100 g of water at 30oC.What mass of the salt would crystallize, if 50 g of copper (ll) tetraoxosulphate (Vl) solution saturated at 100°C were cooled to 30°C?
A. 57.5 g B. 42.9 g
C. 28. 6g D. 14.3 g

18. A sample of temporary hard water can be prepared in the laboratory by.
A. dissolving calcium chloride in distilled water
B. saturating lime water with carbon(lV) oxide
C. saturating distilled water with calcium hydroxide
D. dissolving sodium hydrogen trioxocarbonate (lV) in some distilled water.

19. A property of a colloidal dispersion which a solution does not have is .
A. the Tyndall effect
B. homogeneity
C. osmotic pressure
D. surface polarity.

20. 50 cm3 of sulphur (lV) oxide, 800cm3 of ammonia, 450 cm3 of hydrogen chloride, 1.0 cm3 of water at 15oC. Which of the following is suitable for demonstrating the fountain experiment?
A. Sulphur (lV) oxide and hydrogen chloride
B. Carbon (lV) oxide and ammonia
C. Ammonia and hydrogen chloride
D. Carbon (lV) oxide and sulphur (1V) oxide

21.



A simple cell

Which of the following substances could be satisfactorily used as X in the above figure?

A. Ammonia and Potassium hydroxide
B. Potassium hydroxide and sodium chloride
C. Ammonia and ethanoic acid
D. Ethanoic and sodium chloride

22. What volume of CO_2 at s.t.p would be obtained by reacting $10cm^3$ of 0.1 M solution of anhydrous sodium trioxocarbonate (lV) with excess acid?

A. 2.240 cm_3 B. 22.40 cm_3
C. 224.0 cm_3 D. 2240 cm_3

[G.M.V at s.t.p = 22.4 dm_3

23. If a current of 1.5 A is passed for 4.00 hours through a molten tin salt and 13.3 g of tins is deposited, What is the oxidation state of the metal in the salt?

A. 1 B. 2
C. 3 D. 4

[Sn = 118.7, F = 96500 C mol^{-1}]

24. Which of the following equivocal solutions, Na_2CO_3, Na_2SO_4, $FeCl_3$, NH_4Cl and CH_3COONa, have pH greater than?

A. $FeCl_3$ and NH_4Cl
B. Na_2CO_3 CH_3COONa and Na_2SO_4,
C. Na_2CO_3 and CH_3COONa
D. $FeCl_3$, CH_3COONa. NH_4Cl

25. $MnO^-_4 + 8H^+ + ne \longrightarrow M^{++} + 4H_2O$. Which is the value of n the reaction above?

A. 2 B. 3
C. 4 D. 5

26. $2H_{2(g)} + SO_{2(g)} \longrightarrow 3S_{(s)} + 2H_2O_{(1)}$. The above reaction is

A. a redox reaction in which H_2S is the oxidant and SO_2 is the reductant.
B. a redox reaction in which $SO_2$is the oxidant and H_2S is the reductant.
C. Not a redox reaction because there is no oxidant in the reaction equation
D. Not a redox reaction because there is no reductant in the reaction equation.

27. Manganese(lV) oxide is known to hasten the decomposition of hydrogen peroxide. Its main actions is to.

A. increase the surface area of the reactants
B. increase the concentration of the reactants
C. lower the activation energy for the reaction
D. lower the heat of reaction, H, for the reaction,

28. 1.1 g of $CaCl_2$ dissolved in 50 cm^3 of water caused a rise in temperature of 34°C. The heat reaction, H for $CaCl_2$ in kJ per moles is

A. -71.1 B. –4.18
C. +17.1 D. +111.0

[Ca = 40, Cl = 35.5, specific heat of water is 4.18 KJ^{-1}

29. $NO + CO \rightleftharpoons 1/2\ N_2 + CO_2 \quad \Delta H = -89.3kJ$

.What conditions would favour maximum conversion of nitrogen (ll) oxide and carbon(ll) oxide in the reaction above?

A. low temperature and high pressure
B. high temperature and low pressure
C. high temperature and high pressure
D. low temperature and low pressure.

30. Which of the following equilibria is unaffected by a pressure change?

A. $2NaCl \longleftrightarrow 2Na + Cl_2$
B. $H_2 + I_2 \rightleftharpoons 2HI$
C. $2O_3 \rightleftharpoons 3O_2$
D. $2NO_2 \longleftrightarrow N_2O_4$

31.

Initial concentration of no in moles	Initial Rate (moles / sec)
0.001	3.0×10^{-5}
0.002	1.2×10^{-4}

The data in the table above shows the rate of reaction of nitrogen (ll) oxide with chlorine at 25°C. It can be concluded that doubling the intial concentration of NO increase the rate of reaction by factor of

A. two B. three
C. four D. five

32. Which of the following gases will rekindle a brightly glowing splint?

A. NO_2 B. NO
C. N_2O D. Cl_2

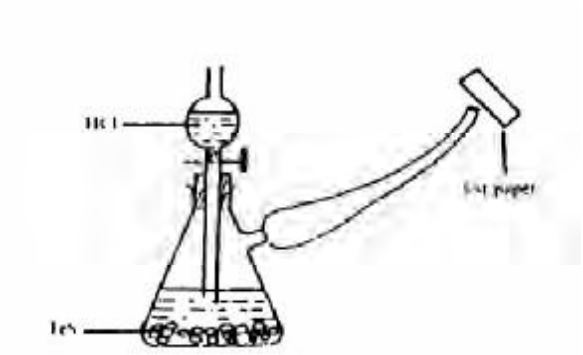
33. Which of the following salts can be melted without decomposition?

A. Na_2CO_3 B. $CaCO_3$
C. $MgCO_3$ D. $ZnCO_3$

34. Oxygen gas can be prepared by heating

A. ammonium trioxonirate (V)
B. ammonium trioxonirate (lll)
C. potassium trioxonirate (V)
D. manganese (lV) oxide.

35.



The appropriate test paper to use in the above experiment is moist.

A. litmus paper
B. potassium heptaoxodichromate (1V) paper
C. lead (11)trioxonirate (V) paper.
D. Universal indicator paper.

36. Addition of aqueous ammonia to a solution of Zn^{++} gives a white precipitate which dissolves in an excess of ammonia because.

A. zinc is amphoteric
B. zinc hydroxide is readily soluble
C. zinc forms a complex which is readily soluble in excess ammonia
D. ammonia solution is a strong base.

37. Which of the following, in clear solution, forms a white precipitate when carbon(1V) oxide is bubbled into it for a short time?

A. KOH B. NaOH
C. $Ca(OH)_2$ D. $Al(OH)_3$

38. Copper (11) tetraoxosulphate (V1) is widely used as a

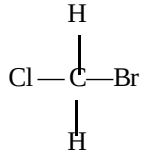
A. Fertilizer B. Fungicide
C. Disinfectant D. Purifier

39. Which of the following metals can be prepared in samples by the thermal decomposition to their trioxonirate (V) salt?

A. Copper and mercury
B. Silver and copper
C. Mercury and silver
D. Magnesium and mercury

40. Which of the following compounds can exist as geometric isomers?

A. 2-methylbut2-ene
B. But-2-ene
C. But-1-ene
D.



41. How many structural isomers can be written for the alkyl bromide C_2H_9Br?

A. 3 B. 4
C. 6 D. 8

42. The final products of the presence of ultraviolet light are hydrogen chloride and

A. chloromethane
B. tetrachloromethane
C. trichloromethane
D. dichloromethane

43. How many grams of bromine will be required to completely react with 10 g of propyne?

A. 20 g B. 40 g
C. 60 g D. 80 g
[C = 12, H = 1, Br = 80].

44. Ethene when passed into concentrated H_2SO_4 is rapidly absorbed. The product is diluted with water and then warmed to produce.

A. ethanol B. diethyl ether
C. ethanal D. diethyl sulphate.

45. One of the advantages of detergents over soap is that detergents.

A. are easier to manufacture
B. foam more than soap
C. form soluble salts with hard water
D. are able to deter germ more than soap.

46. $CH_3CH_2CHCH_2 \xrightarrow{\text{alc.KOH}} CH_3CH = CHCH_3$

X $CHCH_3 + CH_3CH_2CH = CH_2$

The above reaction is an example of

A. dehydration
B. dehydrohalogenation
C. neutralization
D. a fission reaction

47. A certain liquid has a high boiling point. It is viscous, non-toxic, miscible with water to be hygroscopic. This liquid is most likely to be.

A. $CH_3CH_2CH_2CH_2OH$
B. $CH_3CH_2OHCH_3$
C. $CH_3CH_2CHOHCH_3$
E. $CH_3OHCHOCH_2OH$

48. The compound.

$CH_3\bar{C}H\bar{C}H3$
sCH_2Cl

Is known as

A. 1-chloro-2-methylbutane
B. 1-chloro-2-methylpronane
C. 2-chloromethylethane
D. 1-chloro-2,2-dimethylethane

49. Which of the following statements is TRUE of the complete hydrolysis of a glyceride by sodium hydroxide?

A. 3 moles of NaOH are required for each mole of glyceride
B. 3 moles of glycerol are produced
C. only one mole of soap is formed.
D. Concentrated H_2SO_4 is essential for the completion of the reaction.

50. Which of the following are the products of the reaction between CH_3COOH and Cl_2 in sunlight?
A. $ClCH_2COOH + HCl$
B. $CH_3COCl + HOCl$
C. $CH_3COOCl + HCl$
D. $CH_3COCl + H_2O$

Chemistry 1992

1. Which of the following substances is not a homogeneous mixture?
A. Filtered sea water
B. Soft drink
C. Flood water
D. Writing ink

2. There is a large temperature interval between the melting point and the boiling point of a metal because.
A. metals have very high melting points
B. metals conduct heat very rapidly
C. melting does not break the metallic bond but boiling does.
D. the crystal lattice of metals is easily broken.

3. How many moles of $[H^+]$ are there in 1 dm^3 of 0.5 solution of H_2SO_4
A. 2.0 moles B. 1.0 mole
C. 0.5 mole D. 0.25 mole

4. $wH_2SO_4 + xA(OH)_3 \longrightarrow yH_2O + zAl_2(SO4)_3$. The respective values of w, x, y and z in the equation above are
A. 2,2,5 and 1 B. 3,2,5and 2
C. 3,2,6 and 1 D. 2,2,6 and 2

5. A given mass of gas occupies 2 dm^3 at 300 K. At what temperature will its volume be doubled keeping the pressure constant?
A. 400 K B. 480 K
C. 550 K D. 600 K

6. If 100 cm^3 of oxygen pass through a porous plug is 50 seconds, the time taken for the same volume of hydrogen to pass through the same porous plug is
A. 10.0 s B. 12.5 s
C. 17.7 s D. 32.0 s
[O = 16, H = 1]

7. Which of the following is a measure of the average kinetic energy of the molecules of a substance.
A. Volume B. Mass
C. Pressure D. Temperature

8 An increase in temperature causes an increase in the pressure of a gas in a fixed volume due to an increase in the
A. number of molecules of the gas
B. density of the gas molecules
C number of collisions between the gas
D. number of collision between the gas molecules and the walls of the container.

9. The nucleus of the isotope tritium, contains
A. two neutrons with no protons
B. one neutron and one proton
C. two neutron and one electron
D. two neutron, one proton, and one electron.

10. How many lone pairs of electron are there on the central atom of the H_2O molecules?
A. 1
B. 2
C. 3
D. 4

11. $^{14}N + X \longrightarrow {}^{17}_{8}O + {}^{1}_{1}H$. In the above reaction , X is a
A. neutron, B. Helium atom
C. Lithium atom D. Deutrium atom

12. Four elements P,Q,R and S have 1,2,3 and 7 electrons in their outermost shells respectively. The element which is unlikely to be a metal is
A. P B. Q
C. R D. S

13. The pollutants that are likely to be present in an industrial environment are
A. H_2S, SO_2 and oxides of nitrogen
B. NH_3, HCl and CO
C. CO_2 NH_3 and H_2S
D. Dust, No and Cl_2

14. Which of the following gases dissolves in water vapour to produce acid rain during rainfall?
A. Oxygen
B. Carbon (11) oxide
C. Nitrogen
D. Sulphur (lV) oxide

15. Water for town supply is chlorinate to make it free from
A. bad odour
B. bacteria
C. temporary hardness
D. permanent hardness.

16. On which of the following is the solubility of a gaseous substance dependant? 1. Nature of solvent. 11. Nature of solute 11. Temperature. 1V.Pressure.
A. l, ll, lll and lV B. l and ll only
C. ll only D. l, lll and iV only

17. An emulsion paint consist of
A. gas or liquid particles dispersed in liquid
B. liquid particles dispersed in liquid
C. solid particles dispersed in liquid
D. solid particles dispersed in solid

18. A sample of orange juice is found to have a pH of 3.80. What is the concentration of the hydroxide ion in the juice?
A. 1.6×10^{-4} B. 6.3×10^{-11}
C. 6.3×10^{-4} D. 1.6×10^{-11}

19. Arrange HCl, CH_3COOH, $C_6H_5CH_3$ in order of increasing conductivity.
A. $HCl, CH_3COOH, C_6H_5CH_3$
B. $C_6H_5CH_3$ HCl, CH_3, COOH
C. $C_6H_5CH_3$ COOH, HCl,
D. CH_3, COOH, $C_6H_5CH_3$, HCl

20. Which of these is an acid salt?
A. $K_2SO_4A_{l2}(SO_4)_3.24H_2O$
B. $CuCO_3.Cu(OH)_2$
C. NaHS
D. $CaOCl_2$

21. How many grams of H_2SO_4 are necessary for the preparation of 0.175 dm^3 of 6.00 M H_2SO_4?
A. 206.0 g
B. 103.0 g
C. 98.1 g
D. 51.5 g
[S = 32.06, O = 16.00, H = 1.00].

22. Copper (ll) tetraoxosulphate (lV) solution is electrolyzed using carbon electrodes. Which of the following are produced at the anode and cathode respectively.
A. Copper and oxygen
B. Oxygen and copper
C. Hydrogen and copper
D. Copper and hydrogen

23. Calculate the mass, in kilograms, of magnesium produced by the electrolysis of magnesium(ll) chloride in a cell operating for 24 hours at 500 amperes.
A. 2.7 B. 5.4
C. 10.8 D. 21.7
[Faraday = 96,500 C $mmol^{-1}$, Mg = 24]

24. $MnO_2 + 2Cl^- + 4H \longrightarrow Mn^{2+} + Cl_2 + 2H_2O$. The change is oxidation numbers when the manganese, chlorine and hydrogen ions react according to the above equation are respectively.
A. 2, 2, 4 B. –1,-2 4
C. –2, 1, 0 D. 2, 4, 0

25. $S_2O3^{2-} + l_2 \longrightarrow S_4O6^{2-} + 21$. In the reaction above, the oxidizing agents is
A. S_2O3^{2-}
B. l_2
C. S_4O6^{2-}
D. l^-

26. In which of the following is the entropy change positive?
A. $H_2O_{(l)} \longrightarrow H_2O(g)$
B. $Cu^{2+}_{(aq)} + Fe_{(s)} \longrightarrow Fe^{2+}_{(aq)} + Cu_{(s)}$
C. $N_{2(g)} + 3H_{2(g} \longrightarrow 2NH_{3(g)}$
D. $2HCl_{(s)} \longrightarrow N_{2(g)} + Cl_{2(g)}$

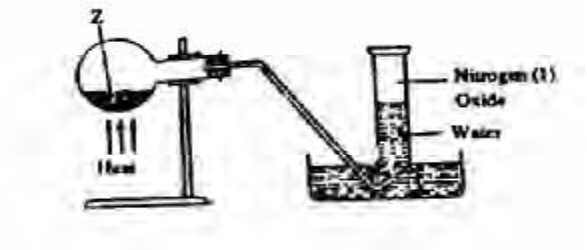
27. In what way is equilibrium constant for the forward reaction related to that that of the reverse reaction?
A. The addition of the two is expected to be one
B. The product of the two is expected to be one
C. The two equilibrium constants are identical
D. The product of the two is always greater than one.

28. Which of the following equilibra shows little or no net reaction when the volume of the volume of the system is decreased?
A. $H_{2(g)} + I_{2(g} \longleftrightarrow 2HI_{(g)}$
B. $2NO_{2(g} \longleftrightarrow N_2O_{4(g)}$
C. $PCl_{5(} \longleftrightarrow PCl_{3(g)} + Cl_{2(g)}$
D. $ZnO_{(s)} + CO_{2(g} \longleftrightarrow ZnCO_{3(s)}$

29. For a general equation of the nature $xP + yQ \longleftrightarrow mR + nS$, the expression for the equilibrium constant is
A. $k[P]^x[Q]^y$
B. $\dfrac{[P]^x[Q]^y}{[R]^m[S]^n}$
C. $\dfrac{[R]^m[S]^n}{[P]^x[Q]^y}$
D. $\dfrac{m[R]\,n[S]}{X[P]\,y[Q]}$.

30. Which of these statements is TRUE about carbon(1V)oxide?
A. It supports combustion
B. It is strong acidic in water
C. It is very soluble in water
D. It supports the burning of magnesium to produce magnesium oxide.

31.



In the experiment above, Z can be
A. a solution of sodium dioxonitrate(lll) and ammonium chloride
B. a solution of lead trioxonitrate(V)

C. a solution of sodium trioxonitrate(V) and ammonium chloride
D. concentrated tetraoxosulphate (Vl) acid and sodium trioxonitrate(V).

32. Which of the following combination of gases is used for metal welding? 1. Oxygen and ethyne. ll Hydrogen and ethyne. 1ll. Hydrogen and oxygen. 1V Ethyne, hydrogen and oxygen.
A. 1 and 11 B. 111 and 1V
C. 1 and 111 D. 11 and 1V

33. Which of the following oxides of nitrogen is unstable in air?
A. NO_2 B. NO
C. N_2O_4 D. N_2O_5

34. The gas formed when ammonium trioxonitrate (V) is heated with sodium hydroxide is
A. hydrogen
B. nitrogen(1V) oxide
C. oxygen
D. ammonia

35. Safety matches contain sulphur and
A. Potassium trioxochlorate(V)
B. Potassium trioxonitrate (V)
C. Charcoal
D. Phosphorus sulpide

36. Addition of an aqueous solution of barium chloride to the aqueous solution of a salt gives a white precipate.
A. nitrate B. carbonate
C. chloride D. sulphide

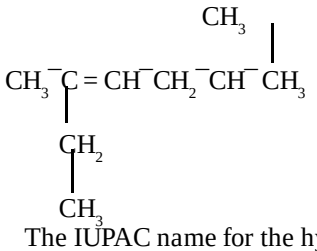
37. Sodium hydroxide solution can be conveniently stored in a container made of
A. lead B. zinc
C. aluminum D. copper

38. Which of the following is NOT used as raw material in the solvary process?
A. Ammonia
B. Sodium chloride
C. Calcium trioxocarbonate
D. Sodium trioxocarbonate(V1)

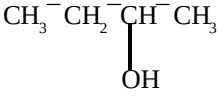
39. Duralumin consists of aluminum, copper,
A. zinc and gold
B. lead and manganese
C. nickel and silver
D. manganese and magnesium.

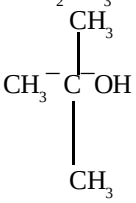
40. $CaO_{(s)} + H_2O_{(1)} \rightarrow Ca(OH)_{2(s)}$ H = -65kJ. The process represented by the above equation is known as.
A. dissolution B. slackin
C. liming D. mortaring

41. The carbon atoms in ethane are
A. sp^3 hybridized
B. sp hybridized
C. sp^2 hybridized
D. not hybridized.

42.


The IUPAC name for the hydrocarbon above is
A. 2-ethyl-5-methylhex-2-ene
B. 2, 5-dimethylhex-2-ene
C. 3,5-dimethylhept-3-ene
D. 3,6-dimethylhexpt –3-ene

43. Which of the following compounds is a secondary alkanol?
A.

C. $CH_3CH_2CH_2CH_2OH$
D. $CH_3CH_2OCH_2CH_3$



44. Which of the following compounds reacts with sodium metals as well as silver and copper salt.
A. $CH_3Ca \equiv C-CH_3$
B $CH_3CH_2CH_2CH_2CH_3$
C. $CH_3Ca \equiv CH_3$
D. $CH_3CH \equiv CHCH_3$

45. Which of the following are isomers?
A. Ethanol and dimethyl ether
B. Benzene and methylbenzene
C. Ethanol and propanone
D. Trichloromethane and tetrachloromehane

46. The function group present in an treatment with a saturated solution of $NaHCO_3$ is .
A. hydroxyl group
B. carbonalkoxyl group
C. carbonyl group
D. carboxy group.

47. The characteristic reaction of carbonyl compounds is.
A. Substitution B. Elimination
C. Addition D. Saponificatioon

48. An organic compound containing 40.1% carbon and 6.667% hydrogen has an empirical formula of .
A. $C_2H_4O_2$ B. $C_2H_3O_2$
C. CH_2O D. CH_3O

49. Alkanals can be differentiated from alkanones by reaction with.
A. 2,4-dinitrophenlhydrazine
B. hydrogen cyanide
C. sodium hydrogen sulphite
D. tollen's reagent.

50. An example of a polysaccharide is
A. dextrose B. mannose
C.glucose D. starch.

Chemistry 1993

1. The dissolution of common salt in water is physical change because
   A. the salt can be obtained by crystallization
   B. the salt can be recovered by the evaporation of water.
   C. Heat is not generated during mixing
   D. The solution will not boil at 100°C

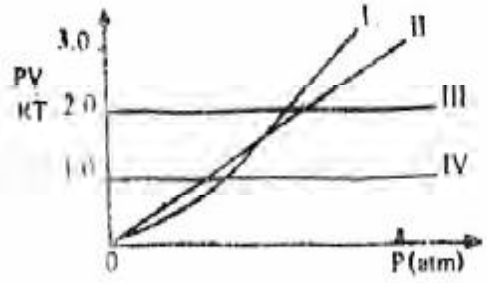
2. Which of the following substances is mixture?
   A. Sulphur powder B. Bronze
   C. Distilled water D. Ethanol

3. How many moles of oxygen molecules would be produced dfrom the decompostition of 2.5 moles of potassium trioxochlorate (V)?
   A. 2.50 B. 3.50
   C. 3.75 D. 7.50

4. A balanced chemical equation obeys the law of
   A. Conservation of mass
   B. Definite proportions
   C. Multiple proportions
   D. Conservation of energy

5. At 25°C and 1 atm, a gas occupies a volume of 1.50 dm^3. What volume will it occupy at 100°C at 1 atm?
   A. 1.88 dm^3 B. 6.00 dm^3
   C. 18.80 dm^3 D. 60.00 dm^3

6. A gaseous mixture of 80.0 g of oxygen and 56.0 g of nitrogen has a total pressure of 1.8 atm. The partial pressure of oxygen in the mixture is
   A. 0.8 atm B. 1.0 atm
   C. 1.2 atm D. 1.4 atm
   [O = 16, N = 14]

7. 

   Which of the curves above represents the behavior of 1 mole of an ideal gas?
   A. 1 B. 11
   C. 111 D. 1V

8. For iodine crystals to sublime on heating, the molecules must acquire energy that is
   A. less than the forces of attraction in the solid
   B. equal to the forces of attraction in the solid
   C. necessary to melt the solid
   D. greater than the forces of attraction in both solid and the liquid phases

9. An element, E, has the electronic configuration $1s^2 2s^2 2p^6 3s^2 3p^3$. The reaction of E with a halogen X can give.
   A. EX_3 and EX_5 B. EX_3 only
   C. EX_5 only D. EX_2 and EX_3

10. Two atoms represented as $^{235}_{92}U$ and $^{238}_{92}U$ are
    A. isomers B. allotropes
    C. isotopes D. anomers

11. As the difference in electronegativity between bonded atoms increase, polarity of the bond
    A. decreases B. increases
    C. remains unchanged
    D. reduces to zero.

12. Which group of elements forms hydrides that are pyramidal in structure?
    A. 111 B. 1V
    C. V D. V1

13. Water has a rather high boiling point despite its low molecular mass because of the presence of
    A. hydrogen bonding
    B. covalent bonding
    C. ionic bonding
    D. metallic bonding

14. Argon is used in gas-filled electric lamps because it helps to
    A. prevent the reduction of the lamp filament
    B. prevent oxidation of lamp filament
    C. make lamp filaments glow brightly
    D. keep the atmosphere in the lamp inert.

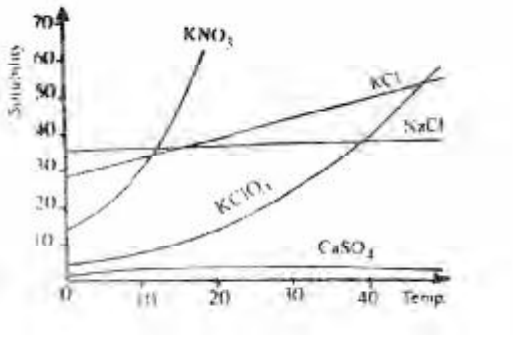
15. The air around a petroleum refinery is most likely to contain
    A. CO_2 SO_3 and N_2O
    B. CO_2 CO and N_2O
    C. SO_3 CO and NO_2
    D. PH_3 H_2O and CO_2

16. Water can be identified by the use of
    A. an hydrogen copper(11) tetraoxosulphate(1V)
    B. an hydrogen sodium trioxocarbonate(1V)
    C. potassium heptaoxochromate(vii)
    D. copper (11) trioxocarbonate(iv)

17. The phenomenon whereby sodium trioxocarbonate (1) decahydrate loses some of its water crystallization on exposure to the atmosphere is known as
    A. deliquescence B. hygroscopy
    C. effervescence D. efflorescence

18. A student prepares 0.5 M solution each of hydrochloric and ethanoic acids and then measured their pH. The result would show that the
A. pH values are equal
B. HCl solution has higher pH
C. Sum of the pH values is 14
D. Ethanoic acid solution has a higher pH.

19.



For which salt in the graph above does the solubility increase most rapidly with rise in temperature
A. $CaSO_4$ B. KNO_3
C. NaCl D. KCl

20. $NH_3 + H_3O \longrightarrow NH_4 + H_2O$. it may be deduced from the reaction above that
A. a redox reaction has occurred
B. H_3O^+ acts as an oxidizing agent
C. H_3O^+ acts as an acid
D. Water acts as an acid

21. 4.0 g of sodium hydroxide in 250 cm^3 of solution contains
A. 0.40 moles per dm^3
B. 0.10 moles per dm^3
C. 0.04 moles per dm^3
D. 0.02 moles per dm^3

22. During the electrolysis of a salt of metal M, a current of 0.05 A flow for 32 minutes 10 second and deposit 0.325 g of M. What is the charges of the metal ion?
A. 1
B. 2
C. 3
D. 4
[M = 65,l = 96,500 C per mole of electron]

23. Which of the following reactions occurs at the anode during the electrolysis of a very dilute aqueous solution of sodium chloride?
A. OH –CH$\longrightarrow$ OH
B. $Cl^- - e^- \longrightarrow Cl$
C. OH + Cl$\longrightarrow$HCl
D. $Na^+ + e^- \xrightarrow{Hg}$ Na/Hg amalgam

24.

Half – cell reaction	E^0
Cu2+(aq) + 2e$\longrightarrow$Cu(s)	+0.34V
Fe2+(aq) + 2e$\longrightarrow$ Fe	-0.44V
Ba2+(aq) + 2e$\longrightarrow$ Ba(s)	-2.90V
Zn2+(aq) + 2e$\longrightarrow$Zn(s)	-0.76V

From the data above, it can be deduced that the most powerful reducing agent of the four metals is
A. Cu B. Fe
C. Ba D. Zn

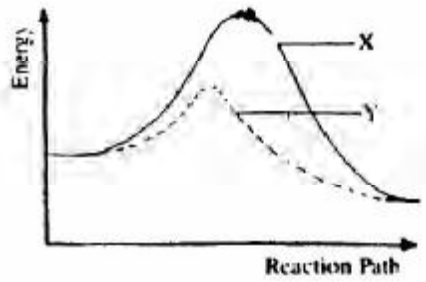
25. The oxidation states of chlorine in HOCl, $HClO_3$ and $HClO_4$ are respectively
A. -1, +5 and +7
B. –1 ,-5 and 7
C. +1, +3 and +4
D. +1, +5 and +7

26. A reaction takes place spontaneously if
A. ÄG = O
B. ÄS < O and ÄH > O
C. ÄH < TÄS
D. ÄG>O

28. The standard enthalpies of formation of $CO_2(g)$, $H_2O(g)$ and CO(g) in kJ mol-1 are –394, -242 and –110 respectively. What is the standard enthalpy change for the reaction $CO(g) + H_2O \longrightarrow CO_2(g) + H_2(g)$?
A. -42 kJ mol-1
B. +42 kJ mol-1
C. –262 kJ mol-1
D. +262 kJ mol-1

29. 10 g of a solid is in equilibrium with its own vapour. When 1 g of a small amount of solid is added, the vapour pressure
A. remain the same
B. drops
C. increase by 1%
D. increase by 99%

30.



In the diagram above, curve X represents the energy profile for a homogeneous gaseous reaction. Which of the following conditions would produce curve Y for the same reaction?
A. increase in temperature
B. increase in the concentration of a rectant
C. addition of a catalyst
D. increase in pressure.

31. $NaCl(s) + H_2SO_4(1) \longrightarrow HCl(g) + NaHSO_4(s)$. In the reaction above. H2SO4 behaves as
A. a stron acid
B. an oxiding agent
C. a good solvent
D. a dehydrating agent.

32. Which of these salts will produce its metal, oxygen and nitrogen(1V) oxide on heating?
A. Silver trioxonitrate(V)
B. Sodium trioxonitrate (V)
C. Calcium trioxonitrate (V)
D. Lithium trioxonitrate (V)

33. An experiment produces a gaseous mixture of carbon (1V) oxide and carbon(11) Oxide. In order to obtain pure carbon (11) oxide, the gas mixture should be
A. passed over heated copper(11) oxide
B. bubbled through concentrated tetraoxosulphate(V1) acid
C. bubbled through sodium hydroxide solution
D. bubbled through water.

34. Which of the following is property of ionic chlorides?
A. They can be decomposed heat.
B. They react with aqueous $AgNO_3$ to give q white precipitate which is soluble in excess ammonia
C. They explode when in contact with dry ammonia gas
D. They react with concentrated tetraoxosulphate (V1) acid to give white fumes of chlorides gas

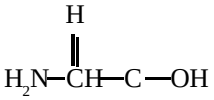
35. When dilute aqueous solutions of (11) nitrate and potassium bromide are mixed, a precipitate is observed. The products of this reaction are.
A. PbO(s) + Br- (aq) + KNO_3
B. Br_2 + NO2(g) + PbBr2(s)
C. PbO(s) PbO(s) + K+(aq) + Br(aq) + NO_2(g)
D. $PbBr_2$(s) + K+(aq) + NO_3(aq)

36. Bronze is an alloy will react to
A. Silver and copper
B. Silver and gold
C. Copper and nickel
D. Copper and zinc

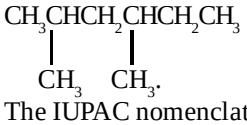
37. Copper metal will react with concentrated trioxonitrate (V) acid to give
A. $Cu(NO_3)_3 + NO + N_2O_4 + H_2O$
B. $Cu(NO_3)_2 + NO + H_2O$
C. $CuO + NO_2 + H_2O$
D. $Cu(NO_3)_2 + NO_2 + H_2O$

38. The active reducing agent in the blast furnace for the extraction of iron is
A. carbon B. limestone
C. carbon (11) oxide D. calcium oxide

39. Al2O3(s) + 3H2SO4(aq)=Al2(SO4)3(aq) + 3H2O(1) Al2O3(s) + 2NaOH(aq) + 3H2O (1) '! 2NaAl(OH)4(aq). We can conclude from the equations above that Al2O3(s) is
A. an acidic oxide
B. an amphoteric oxide
C. a basic oxide
D. a neutral oxide

40. 
The two functional groups in the above compound are.
A alcohol and amine
B. acid and amine
C. aldehyde and acid
D. ketone and mine

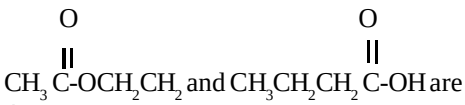
41. The fraction of crude oil used as jet fule is
A. refinery gas
B. diesel oil
C. kerosene
D. gasoline

42. 
The IUPAC nomenclature for the compound above is.
A. dimethylhexane
B. 3,5 dimethlpentane
C. 1,1 dimethyl , 3 methylpentane
D. 2,4 dimethylhexane.

43. It is not desirable to use lead tetraethyl as an anti-knock agent because
A. it is expensive
B. of pollution effects from the exhaust fumes
C. it lowers the octane rating of petrol
D. it is explosive.

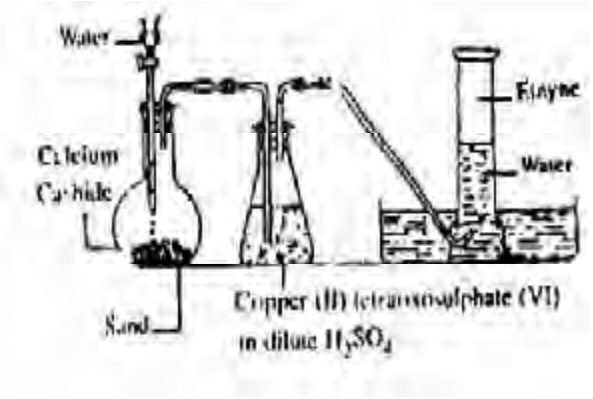
44. The carbon atoms on ethane are
A. sp^2 hybridized
B. sp^3 hybridized
C. sp^2d hybridized
D. sp hybridized.

45. Catalytic hydrogenation of benzene produces
A. an aromatic hydrocarbon
B. margarine
C. cyclohexane
D. D.D.T

46. 
are
A. isomers
B. esters
C. carboxylic acids
D. polymers.

47. Palm wine turns sour with time because.
A. the sugar content is converted into alcohol
B. the carbon(1V) oxide formed during the fermentation process has a sour taste
C. it is commonly adulterated by the tappers and sellers
D. microbial activity results in the production of organic acids within it.

48



The function of the copper (11) tetraoxosulphate (V1) in dilute H_2SO_4 in the figure above is to

A. Dry the gas
B. Absorb phosphine impurity]
C. Absorb ethene impurity
D. Form an acetylide with ethyne.

49. Which of the represents Saponification?

A. reaction of carboxylic acids with sodium hydroxide
B. reaction of Alkanoates with acids
C. reaction of carboxylic acids with sodium alcohols
D. reaction of Alkanoates with sodium hydroxide.

50. The confirmatory test for Alkanoic acids in organic qualitative analysis is the

A. turning of wet blue litmus paper red
B. reaction with alkanols to form esters
C. reaction with sodium hydroxide to foem salt and water
D. reaction with aqueous Na2CO3 to liberate a gas which turns lime water milky.

Chemistry 1994

1. A mixture of sand, ammonium chloride and sodium chloride is best separated by

A. sublimation followed by addition of water and filtration
B. sublimation followed by addtion of water and evaporation
C. addition of water followed by filtration and sublimation
D. addition odf water followed by crystallization and sublimation.

2. A pure solid usually melts

A. over a wide range of temperature
B. over a narrow range of temperature
C. at a lower temperature than the impure one
D. at the same temperature as the impure one.

3 At the same temperature and pressure, 50 cm^3 of nitrogen gas contains the same number of molecules as

A. 25 cm^3 of methane
B. 40 cm^3 of hydrogen
C. 50 cm^3 of ammonia
D. 100 cm^3 of chlorine

4. 8 g CH_4 occupies 11.2dm^3 at s.t.p. What volume would 22 g of CH_3CH_2CH occupy under the sme condition?

A. 3.7 dm^3 B. 11.2 dm^3
C. 22.4 dm^3 D. 33.6 dm^3
[C= 12, H =1]

5. To what temperature must a gas 273 K be heated in order to double both its volume and pressure?

A. 298 K B. 546 K
C. 819K D. 1092 K

6. For a gas, the relative molecular mass is equal to 2Y. What is Y?

A. The mass of the gas
B. The vapour density of the gas
C. The volume of the gas
D. The temperature of the gas

7. The densities of two gases, X and Y are 0.5 g dm^{-3} and 2.0 g dm^{-3} respectively. What is the rate of diffusion of X relative to Y?

A. 0.1 B. 0.5
C. 2.0 D. 4.0

8. An increase in temperature curves causes an increase in the pressure of a gas because

A. it decreases the number of Collision between the molecules
B. the molecules of the gas bombard the walls of the container more frequently
C. it increase the number of Collision between the molecules
D. it causes the molecules to combine

9. The shape of ammonia molecules is

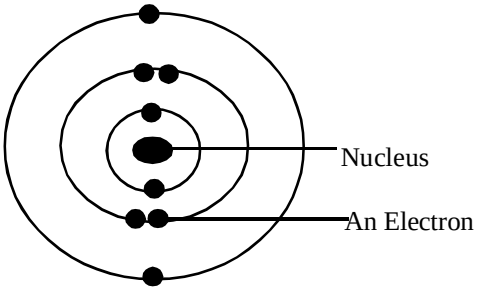
A. trigonal planar
B. octahedral
C. square planar
D. tetrahedral.

10. The number of electrons in the valence shell of an element of atomic number 14 is

A. 1 B. 2
C. 3 D. 4

11. Which of the following physical properties decreases down a group ion the periodic table?
A. Atomic radius
B. Ionic radius
C. Electropositivity
D. Electronegativity.

12



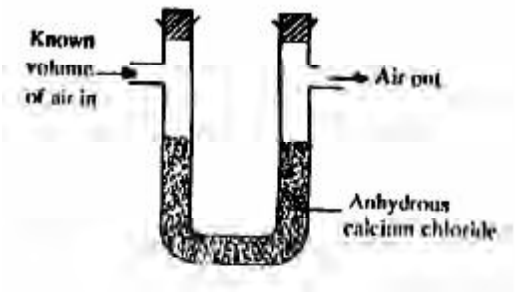
The diagram above represents atom of
A. Mangnesium
B. Helium
C. Chlorine
D. Neon

13. Elements X, Y and Z belongs to groups 1,V and V11 respectively. Which of the following is TRUE about the bond types of XZ and YZ
A. Both are electrovalent
B. Both are covalent
C. XY is electrovalent and YZ_3 is covalent
D. XZ is covalent and YZ_3 is electrovalent.

14. Which of the following atoms represents deuterium?

	No of protons	No of neutrons	No of electrons
A.	1	0	0
B.	1	0	1
C.	1	1	1
D.	1	2	1

15.



The set-up above would be useful for determining the amount of
A. Oxygen in air
B. Water vapour in air
C. CO_2 in air
D. Argon in air.

16. A solid that absorbs water from the atmosphere and forms an aqueous solution is
A. hydrophilic
B. efflorescent
C. deliquescent
D. hygroscopic

17. A major effect of oil pollution in coastal water is the
A. destruction of marine life
B. desalination of water
C. increase in the acidity of the water
D. detoxification of the water.

18. Sodium chloride has no solubility product value because of its.
A. saline nature
B. high solubility
C. low solubility
D. insolubility

19. The solubility in moles per dm^3 of 20.2g of potassium trioxonitrate (V) dissolved in 100g of water at room temperature is
A. 0.10
B. 0.20
C. 1.00
D. 2.00
[K = 39, O = 16, N = 14]

20. A few drops of concentrated PCl are added to about $10cm^3$ of a solution of pH 3.4. The pH of the resulting mixture is
A. less than 3.4
B. greater than 3.4
C. unaltered
D. the same as that of pure water

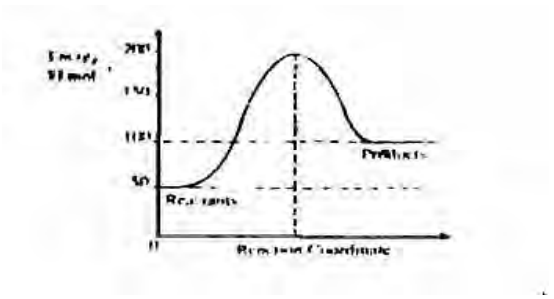
21. Which of the following compounds is a base?
A. CO_2
B. CaO
C. H_3PO_3
D. CH_3COOH

22. $20cm^3$ of a 2.0 M solution of ethanoic acid was added to excess of 0.05 M sodium hydroxide. The mass of the salt produced is
A. 2.50 g
B. 2.73 g
C. 3.28 g
D. 4. 54 g
[Na = 23, C =12, O = 16, H = 1]

23. What volume of oxygen measured at s.t.p would be liberated on electrolysis by 9650 coulombs of electricity?
A. 22.4 dm3
B. 11.2 dm^3
C. 1.12 dm^3
D. 0.560 dm^3
[Molar Volume of gas = 22.4 dm3, F = 96,500 C mol-1]

24. Crude copper could be purified by the electrolysis of concentrated copper911) chloride if the crude copper is
A. made both the anode and the cathode
B. made the cathode
C. made the anode
D. dissolved in the solution.

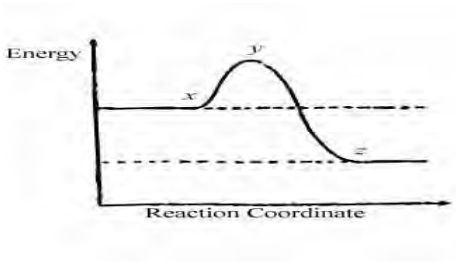
25. $H^-(s) + H_2O(1) \rightarrow H_2(g) + OH^-(aq)$. From the equation above, it can be inferred that the
A. reaction is a double decomposition
B. hydride ion is reducing agent
C. hydride ion is an oxidizing agent
D. reaction is neutralization.

26 

The ΔH for the reaction represented by the energy profile above is
A. $-100\ kJ\ mol^{-1}$
B. $+100\ kJ\ mmol^{-1}$
C. $+50kJ\ mol^{-1}$
D. $-50\ kJ\ mol^{-1}$

27. An anhydride is an oxide of a non-metal.
A. Which will not dissolve in water
B. whose solution water has pH greater than7
C. whose solution in water has a pH less than 7
D. whose solution in ware has a pH of 7

28. $MnO_4(aq) + 8H^+(aq) + Fe^{2+}(aq) \rightarrow Mn^{2+}(aq) + 5Fe^{3+} + 4H_2O(1)$. The oxidation number of manganese in the above reaction change from
A. +7 to +2 B. +6 to +2
C. +5 to +2 D. +4 to +2

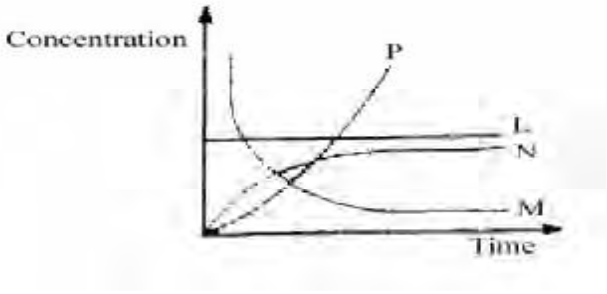
29. 

In the diagram above, the activation energy is represented by
A. y-x B. x
C. x-z D. y

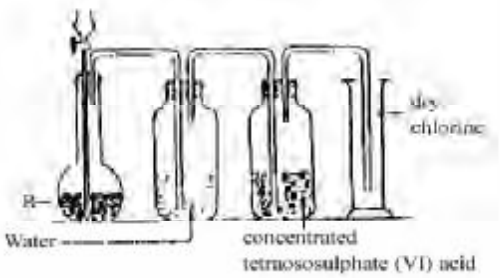
30. Which of the following is TRUE of Le Chatelier's principle for an exothermic reaction?
A. Increase in temperature will cause an increase in equilibrium constant
B. Increase in temperature will cause a decrease in the equilibrium constant
C. Addition of catalyst will cause an increase in the equilibrium constant.
C. Addition of catalyst will cause a decrease in the equilibrium constant.

31. Which of the following are produced when ammonium trioxonirate(V) crystals are cautiously heated in a hard glass round bottomed flask?
A. N_2O and steam
B. NO_2 and ammonia
C. N_2O_4 and NO_2
D. NO and NO_2

32. $2HCl(aq) + CaCO_3(s) \rightarrow CaCl_2(aq) + H2O(10 + CO_2g)$. From the reaction above, which of the following curves represents the consumption of calcium trioxocarbonate(lV) as dilute HCl is added to it?



A. L B. M
C. N D. P

33. 

In the diagram above, R is a mixture of
A. potassium tetraoxochlorate(Vii) and concentrated H_2SO_4
B. potassium tetraoxomanganate (vii) and concentrated HCl
C. manganese(1V) oxide and concentrated HCl
D. manganese (1V) oxide and concentrated HCl

34. Which of these metals CANNOT replace hydrogen from alkaline solutions?
A. Aluminium
B. Zinc
C. Tin
D. Iron

35. Clothes should be properly rinsed with water after bleaching because
A. the bleach decolourizes the clothes
B. chlorine reacts with fabrics during bleaching
C. the clothes are sterilized during bleaching
D. hydrogen chloride solution is produced during bleaching.

36. Which of these solutions will give a white precipate with a solution of barium chloride acidified with hydrochloride acid?
A. Sodium trioxocarbonate(1V)
B. Sodium tetraoxosulphate
C. Sodium trioxosulphate (1V)
D. Sodium sulphides

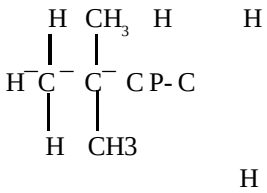
37. SO_3 is NOT directly dissolved in water in the preparation of H_2SO_4 by the contact process because.
A. the reaction between SO3 and water is violently exotheremic
B. acid is usually added to water and never water to acid
C. SO_3 is an acid not dissolve in water readily
D. SO_3 is an acid gas.

38. In an electrolytic set-up to protect iron from corrosion, the iron is
A. made the cathode
B. made the anode
C. used with a metal of lower electropositive potential
D. initially coated with tin

39. Which of the following is NOT true of metals?
A. They are good conductors of electricity
B. They ionize by electron loss
C. Their oxides are acidic
D. They have high melting points.

40. Which of the following is the correct order of decreasing activity of the metal Fe, Ca, Al and Na?
A. Fe > Ca > Al > Na
B. Na > Ca > Al > Fe
C. Al > Fe > Na > Ca
D. Ca > Na > Fe > Al.

41.



The IUPAC name of the compound above is
A. 2,2-dimethyl but-1-yne
B. 2,2-dimethyl but-1-ene
C. 3,3-dimethyl but-1-ene
D. 3,3-dimethyl but-1-yne

43. When sodium is added to ethanol, the products are
A. sodium hydroxide and water
B. sodium hydroxide and hydrogen
C. sodium ethnocide and water
D. sodium ethnocide and hydrogen.

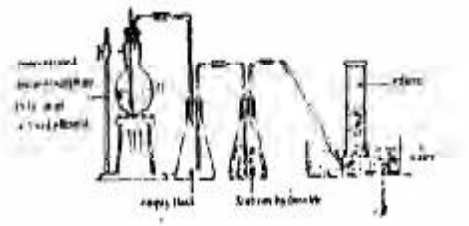
44. The general formula of alkanones is
A. RCHO
B. R_2CO
C. RCOOH
D. RCOOR

45. When sodium ethanoate is treated with a few drops of concentrated tetraoxosulphate(V1) acid one of the products is
A. CH_3COOH
B. CH_3COOH_3
C. $CH_3COOC_2H_5$
D. $C2H_4COOCH$

46. One mole of a hydrocarbon contains 48 g of carbon. If its vapour density is 28, the hydrocarbon is
A. an alkane
B. an alkene
C. an alkyne
D. aromatic

[C= 12, H = 1]

Use the diagram below to answer questions 47 and 48.



The reaction taking place in flask G is known as
A. hydrolysis
B. double decomposition
C. dehydration
D. pyrolysis

48. The caustic soda solution in the conical flask serves to
A. dry ethene
B. remove carbon (1V) oxide from ethene
C. remove carbon (11) oxide from ethene
D. remove sulphur (1V0 oxide from ethene.

49. Which of the following orbital of carbon are mixed with hydrogen in methane?
A. 1s and 2p
B. 1s and 2s
C. 2s and 2p
D. 2s and 3p

50. Which of the following reagents will confirm the presence of instaurations in a compound?
A. Fehling's solution
B. Bromine water
C. Tollen's reagent
D. Benedict's solution

Chemistry 1995

1. Chromatography is used to separate components of mixtures which differ in their rates of
   A. diffusion B. migration
   C reaction D. sedimentation.

2. Which of the following is an example of chemical change?
   A. Dissolution of salt in water.
   B. Rusting of iron
   C. Melting of ice.
   D. Separating a mixture by distillation.

3. The number of hydrogen ions in 4.9 g of tetraoxosulphate (VI) acids is
   A. 3.01×10^{22} B. 6.02×10^{22}
   C. 3.01×10^{23} D. 6.02×10^{22}.
   ($S = 32, O = 16, H = 1, N_A = 6.02 \times 10^{23}$).

4. What volume of oxygen will remain after reacting 8 cm^3 of hydrogen with 20 cm^3 of oxygen?
   A. 10 cm3 B. 12 cm^3
   C. 14 cm^3 D. 16 cm^3.

5. A gas sample with initial volume of 3.25 dm3 is heated and allowed to expand to 9.75 dm3 is heated and allowed to expand to 9.75 dm^3 at constant pressure. What is the ratio of the final absolute temperature to the initial absolute temperature?
   A. 3:1 B. 5:2 C. 5:4
   D. 8:3

6. Two cylinders A and B each contains 30 cm^3 of oxygen and nitrogen respectively at the same temperature and pressure. If there are 5.0 moles of nitrogen, then the mass of oxygen is
   A. 3.2 g B. 6.4g
   C. 80.0g D. 160.0g.

7. A liquid begins to boil when
   A. its vapour pressure is equal to vapour pressure of its solid at the given temperature
   B. molecules start escaping from its surface
   C. its vapour pressure equals the atmosheric pressure
   D. its volume is slightly increased.

8. A particle that contains 8 protons, 9 neutrons and 7 electrons could be written as
   A. $^{16}_{8}O$ B. $^{17}_{8}O^{+}$
   C. $^{17}_{9}O^{+}$ D. $^{17}_{8}O$.

Use the section of the periodic table below to answer questions 9 and 10.

1							L
G	X	5	6	7	J	E	10
11	M	R	14	15	T	17	18

9. Which of the letters indicate an alkali metal and a noble gas respectively?
   A. M and E. B. G and E.
   C. R and L. D. G and L.

10. Which letter represents a non-metal that is a solid at room temperature?
    A. T B. R.
    C. J. D. X.

11. In the oil drop experiment, Milikan determined the
    A. charge to mass ratio of the electron
    B. mass of the electron
    C. charge of the electron
    D. mass of the proton.

12. The stability of ionic solids is generally due to the
    A. negative electron affinity of most atoms
    B. crystal lattice forces
    C. electron pair sharing
    D. positive ionization potentials.

13. Which of the following statements is FALSE about isotopes of the same element?
    A. They have the same number of electrons in their outermost shells.
    B. they have different atomic masses.
    C. They have the same atomic number and the same number of electrons.
    D. they have the same atomic number but different number of electrons.

14. Helium is often used in observation balloons because it is
    A. light and combustible
    B. light and non-combustible
    C. heavy and combustible
    D. heavy and non-combustible.

15. When plastic and packaging materials made from chloromethane are burnt in the open, the mixture of gases released into the atmosphere is most likely to contain
    A. ethane B. chlorine
    C. hydrogen chlorine D. ethane.

16. Deliquescent substances are also
    A. efflorescent B. anhydrous
    C. hydroscopic D. insoluble.

17. The difference between colloids and suspensions is brought out clearly by the fact that while colloids
    A. do not scatter light, suspensions cannot be so separated
    B. can be separated by filteration, suspension cannot be separated
    C. can be separated by a membrane, suspensions cannot
    D. do not settle out on standing, suspensions do.

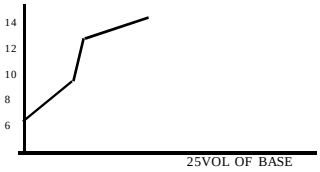
18. In general, an increase in temperatue increases the solubility of a solute in water because
    A. more solute molecules collide with each other
    B. most solutes

dissolve with the evolution of heat
C. more solute molecules dissociate at higher temperature
D. most solutes dissolve with absorption of heat.

19. Neutralization involves a reaction between H_3O^+ and
A. CI^- B. OH^- C. NO_3^- D. CO_3^{2-}.

20. Which of the following solutions will have a pH < 7?
A. $Na_2SO_{4(aq)}$ B. $NaCI_{(aq)}$
C. $Na_2CO_{3(aq)}$ D. $NH_4CI_{(aq)}$.

21. What is the pH of a 2.50 x 10^{-5} M solution of sodium hydroxide?
A. 3.6 B. 5.0
C. 9.4 D. 12.0.



22. The graph above shows the pH changes for the titration of a
A. strong acid versus strong base
B. weak acid versus strong base
C. strong acid versus weak base.
D. weak acid versus weak base.

23. In the process of silver-plating a metal M, the metal M is the
A. anode and a direct current is used
B. cathode and an alternating current is used
C. anode and an alternating current is used.
D. cathode and a direct current is used.

24. How many moles of copper would be deposited by passing 3F of electricity through a solution of copper (II) tetraoxosulphate (VI)?
A. 0.5 B. 1.0
C. 1.5 D. 3.0
(F = 96 500 C mol-1).

25. $2Cl^-_{(aq)} \rightarrow CI_{2(g)} = 2e^-_{(aq)}$. The above half-cell reaction occurring at the anode during the electrolysis of dilute $ZnCI_2$ solution is
A. ionization B. oxidation
C. reduction. D. recombination.

26. Which of the following is a redox reaction?
A. $KCI_{(ag)} + H_2SO_{4(aq)} \rightarrow KHSO_{4(aq)} + HCI_{(aq)}$
B. $2FeBr_{2(ag)} + Br_2 \rightarrow 2FeBr_{3(aq)}$
C. $AgNO_{3(ag)} + FeCI_3 \rightarrow 3AgCl_{(aq)} + CO\ Fe(NO_3)_{3(aq)}$
D. $H_2CO_{3(aq)} \rightarrow H_2O(l) + CO_{2(g)}$.

27. $Cr_2O_7^{2-}{}_{(aq)} + 14H^+_{(ag)} + 6I^-_{(aq)} \rightarrow 2Cr^{3+}_{(ag)} + 3I_{2(g)} + 7H_2O^{(1)+}$.
The change in the oxidation number of oxygen in the equation above is
A. O. B. 1 C. 2 D. 7.

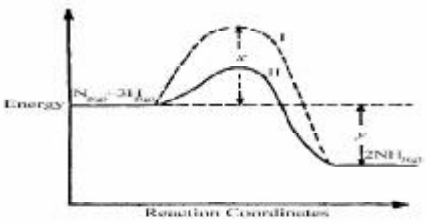
28. If an equilibrium reaction has "H < O, the reaction will proceed favourably in the forward reaction at
A. low temperature
B. high temperatures
C. all temperatures
D. all pressures.

29. Which of the following processes lead to increase in entrophy?
A. mixing a sample of NaCl and sand
B. Condensation of water vapour.
C. Boiling a sampled of water
D. Cooling a saturated solution.

30. Which of the following equibrai is shifted to the right as a result of an increase in pressure?
A. $H_{2(g)} + I_{2(g)} \rightleftharpoons 2H_{(g)}$
B. $2N_2O_{2(g)} \rightleftharpoons N2O_{4(g)}$
C. $PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$
D. $2O_{3(g)} \rightleftharpoons 3O_{2(g)}$.

31. The arrangement above can be used for the collection of
A. sulphur (IV) oxide
B. ammonia
C. nitrogen
D. hydrogen chloride.

32.



The activation energy of the uncatalysed reaction is
A. x
B. x + y
C. x- y
D. y

33. It can be deduced that the rate of the reaction
A. for path I is higher than path II
B. for path II is higher than path I
C. is the same for both paths at all temperatures
D. depends on the values of both x and y at all pressures.

34. In the industrial production of hydrogen from natural gas, carbon (IV) oxide produced along with the hydrogen is removed by
A. washing under pressure
B. passing the mixture into the lime water
C. using ammoniacal copper (I) chloride
D. drying over phosphorus (V) oxide.

35. Sulpur exists in six forms in the solid state. This property is known as
A. isomerism B. allotrophy
C. isotopy D. isomorphism.

36. A gas that will turn orange potassium heptaoxodichromate (VI) solution to clear green is
A. sulpur (VI) oxide
B. hydrogen sulphide
C. sulpur (IV) oxide
D. hydrogen Chloride.

37. Which of the following ions will give a white precipitate with aqueous NaOH and soluble in excess of the base?
A. Ca^{2+} B. Mg^2
C. Zn^{2+} D. Cu^{2+}.

38. In the extraction of iron in the blast furnace, limestone is used to
A. release CO_2 for the reaction
B. reduce the iron
C. Increase in the strenght of Iron
D. remove impurities.

39. Which of the following compound will impart a brick-red colour to a non-luminous Busen flame?
A. NaCl B. LiCl
C. $CaCl_2$ D. MgCl .

40.. Group 1 A metals are not found free in nature because they
A. are of low melting and boiling points
B. have weak metallic bonding
C. conduct electricity and heat
D. are very reactive.

41. $CH_3COOH + CH_3CH_2OH \xrightarrow{Conc\ H_2SO} X + Y$. X and Y in the reaction of above are respectively
A. CH_3COCH_3 and H_2O
B. $CH_3CH_2COCH_2$ and H_2O_2
C. $CH_3COOCH_2CH_3$ and H_2O_3
D. CH_3CH_2CHO and CH_4.

42 $CHCl_3 + Cl_2 \longrightarrow HCl + CCl_4$. The reaction above is an example of
A. an addition reaction
B. a substitution reaction
C. chlorination reaction
D. a condensation reaction.

43. $CH_3 - CH - CH = CH - CH_3\ CH_3$. The IUPAC nomenclature for the compound above is
A. 1.1-dimenthyilbut –ene
B. 2-methlypnet 3 –ene
C. 4,4 –dimethy –1but –2 –ene
D. 4 –methylpent –2 –ene .

44. Which of the following pairs has compounds that are isomers?
A. propanal and propanone
B. ethanoic acid and ethylmethanoate
C. ethanoic acid and thane –1 ,2 –diol
D. 2 –methylbutnae and 2,2 –dimethylbutane

45. Aromatic and aliphatic hydrocarbons can be distinguished from each other by the
A. action of bromine
B. use of polymerization reaction.
C. Action of heat
D. Use of oxidation reaction

46. The role of sodium chloride in the preparation of soap is to
A. purify the soap
B. separate the soap from glycerol
C. accelerate the decomposition of the fat or oil
D. react with glycerol.

$CH_3CH_2{=}CH_2{-}\overset{\overset{O}{\parallel}}{C}{-}H$

47. The functional group represented in the compound above is
A. alkanol B. alkanal
C. alkanone D. alkanoate

48. $C_xH_y + 4O_2 \quad 3CO_2 + 2H_2O$. The hydrocarbon, C_xH_y in the reaction above is
A. propane B. propene
C. propyne D. propanone.

49. An example of a secondary amine is
A. propylene B. di-butylamine
C . methylamine D. trimethylamine.

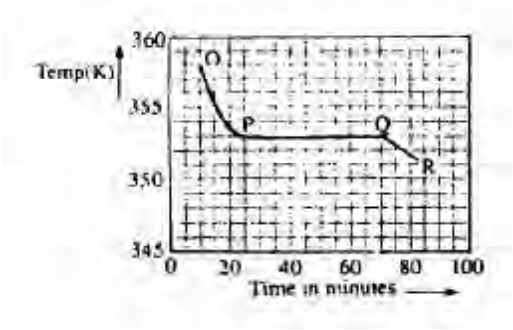
50. The relatively high boiling points of alkanol are due to
A. ionic bonding
B. aromatic character
C. covalent bonding
D. hydrogen bonding.

Chemistry 1997

1. 35 cm^3 of hydrogen was sparked with 12cm^3 of oxygen at 110° C and 760 mm Hg to produce steam. What percentage of the total volume gas left after the reaction is hydrogen
A. 11% B. 31%
C. 35% D. 69%

2. 2.85 g of an oxide of copper gave 2.52g of copper on reduction and 1.90 g of another oxide gave 1.52 g of copper on reduction. The data above illustrates the law of
A. constant composition
B. conservation of mass
C. reciprocal proportions
D. multiple proportions.

Use the graph below to answer question 3 and 4



A sample, X, solid at room temperature, was melted, heated to a temprature of 358 K and allowed to cool as shown in OPQR.

3. The section PQ indicate that X is
   A. a mixture of salt
   B. a hydrated salt
   C. an ionic salt
   D. a pure compound.

4.. The section OP suggests that X is in the
   A. Liquid state
   B. Solid/liquid state
   C. Solid state
   D. Gaseous state.

5. An element, X, format a volatile hydride XH^3 with a vapour density of 17.o. The relation mass of X is
   A. 34.0 B. 31.0
   C. 20.0 D. 14.0

6. A mixture of 0.20 mole of Ar, 0.20 mole of N^2 and 0.30 mole of He exerts a total pressure of 2.1 atm. The partial pressure of He in the mixture is
   A. 0.90 atm B. 0.80 atm
   C. 0.70 atm D. 0.60 atm

7. If $30cm^3$ of oxygen diffuses through a porous plug in 7s, how long will it take 60 cm3 of chlorine to diffuse through the same plug
   A. 12 s B. 14 s
   C. 21 s D. 30 s

8. The temperature of a body decreases when drops of liquid placed on it evaporates because
   A. the atmospheric vapour pressure has a cooling effect on the body
   B. a temperature gradient exists between the drops of liquid and the body
   C. the heat of vapourization is drawn from the bodycausing it to cool
   D. the random motion of the liquid molecules causes a cooling effect on the body.

9. The electron configuration of two elements with similar chemical properties are represented by
   A. $Is^2 2s^2 2p^5$ and $Is^2 2s^2 2p4$
   B. $Is^2 2s^2 2p^4$ and $Is^2 2s^2 2p^6 3s^1$
   C $Is^2 2s^2 2p^6 3s^1$ and $Is^2 2sI$
   D. $Is^2 2s^2 2p^4$ and $Is^2 2sI$

10. In the periodic table, what is the property that decrease along the period and increases down the group
    A. Atomic number
    B. Electron affinity.
    C. Ionization potential
    D. Atomic radius.

11. Two elements, P and Q with atomic numbers 11 and 8 respectively, combine chemically values of x and y are
    A. 1 and 1 B. 1 and 2
    C. 2 and 1 D. 3 and 1

12. Oxygen is a mixture of two isotopes $^{16}_{8}O$ and $^{18}_{8}O$ with relative abundance of 90% and 10% respectively. The relative atomic mass of oxygen
    A. 16.0 B. 16.2
    C. 17.0 D. 18.0

13. $200cm^3$ of air was passed over heated copper in a syringe several times to produce copper (11) oxide. When cooled the final volume of air recorded was $158cm^3$. Estimate the percentage of oxygen in the air.
    A. 31% B. 27%
    C. 21% D. 19%

14. Which of the following gases is the most dangerous pollutant
    A. Hydrogen sulphide
    B. Carbon (1V) oxide
    C. Sulphur (1V) oxide
    D. Carbon (11) oxide

15. A major process involve in the softening of hard water is the
    A. conversion of a soluble calcium salt to its trioxocarbonate (1V)
    B. decomposition of calcium trioxocarbonate (1V)
    C. conversion of an insoluble calcium salt to its trioxocrbonate (1V)
    D. oxidation of calcium atom to its ions.

16. On recrystallization, 20g of magnesium tetraoxosulphate (V1) forms 41 g of magnesium tetraoxosulphate (1V) crystals, $MgSO_4.yH_2O$. The value of y is
    A. 1 B. 3
    C. 5 D. 7
    (Mg = 24, S=32, O=16, H= 1)

17 A satyrated solution of AgCI was found to have a concentration of 1.30×100^{-5} mol $dm^{-3.}$ The solution product of AgCI. therefore is.
    A. 1.30x 10-5 mol 2 dm-6
    B. 1.30 x 10-7 mol2 dm-6
    C. 1.69 x 10-10 mol2 dm-6
    D. 2.60 x 10-12 mol2 dm –6

18. The hydroxyl ion concentration, (OH-), in a solution of sodium hydroxide of pH 10.0 is
    A. 10^{-10} mol dm^{-3}
    B. 10^{-6} mol dm^{-3}
    C. 10^{-4} mol dm^{-3}
    D. 10^{-2} mol dm^{-3}

19. Which of the aqueous solution with the pH values below will liberate hydrogen when it reacts with magnesium metal?
A. 13.0 B. 7.0
C. 6.5 D. 3.0

20. Given that 15.00cm3 of H2SO4 was required to completely neutralize 25.00 cm3 of 0.125 mol dm-3 NaOH, calculate the molar concentration of the acid solution.
A. 0.925 mol dm-3 B. 0.156 mol dm-3
C. 0.104 mol dm-3 D. 0.023 mol dm –3

21. When platinum electrodes are used during the electrolysis of copper (11) tetraoxosulphate (1V) solution, the solution gets progressively
A. acidic B. basic
C. neutral D. amphoteric

22. How many faradays of electricity are required to deposit 0.20 mole of nickel, if 0.10 faraday of electricity deposited 2.98 g of nickel during electrolysis of its aqueous solution?
A. 0.20 B. 0.30
C. 0.40 D. 0.50

(Ni =058.7, IF=96 500C mol^{-1})

23. What is the oxidation unmber of Z in $K_3 ZCI^6$?
A. -3 B. +3
C. –6 D. +6

24. $2H_2S(g) + SO_2(g) + H2O_{(1)} \longrightarrow 3S(s) + 3H_2O(1)$…. (I)
$3CuO(s) + 2NH_3(g) \longrightarrow 3Cu(s) + 3H2)(1) + N_2(g)$… (ii)
In the equation above, the oxidizing agent in (I) and the reducing agent in (ii) respectively are
A H_2S and NH_3
B SO_2 and CuO
C. SO_2 and NH_3
D. H_2S and CuO

25. $2SO_2(g) + O_2(g) \longleftrightarrow 2SO_3(g)$
In the reaction above, the standard heats of formation of $SO_2(g)$ and $SO_3(g)$ are –297 kJ mol-1 and –396 kJ mol^{-1} respectively.
The heat change of the reaction is
A. -99 kJ mol-1 B. –198 kJ mol-1
C. +198 kJ mol-1 D. +683 kJ mol-1

26. ½ N2(g) +1/2 O2(g); H- = 89 kJ mol-1
If the entropy change for the reaction above at 25°C is 11.8 J, calculate the change in free energy, G , for the reaction at 25°C
A. 88.71 KJ
B. 85.48 kJ
C. –204.00 kJ
D. –3427.40 kJ

27. If the rate law obtained for a given reaction is rate=k(X)n(Y)m, what is the overall order of the reaction?
A. nm
B. $\frac{n}{m}$
C. n+m
D. n-m

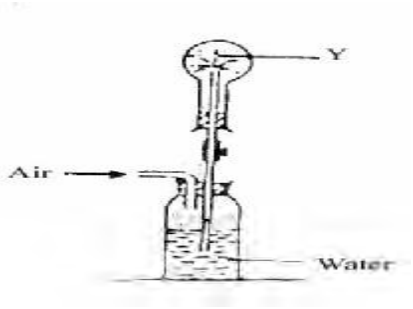
28. One method of driving the positon of equilibrium of an endothermic reaction forward is to
A. increase temperature at constant pressure
B. decrease pressure at constant temperature
C. cool down the apparatus with water
D. decrease temperature at constant pressure.

29. Oxidation of concentrated hydrochloric acid with manganese(1V) oxide liberates a gas used in the
A. manufacture of tooth pastes
B. treatment of simple goiter
C. valcanization of rubber
D. sterilization of water.

30. $mE + nF \rightleftharpoons pG + qH$
In the equation above, the equlibrium constant is given by
A. $\frac{(E)m(F)n}{(G)p(H)q}$
B. $\frac{(E)(F)}{(G)(H)}$
C. $\frac{(G)p(H)q}{(E)m(F)n}$
D. $\frac{(G)(H)}{(E)(F)}$

31. A compound that will NOT produce oxygen on heating is
A. potassium dioxonitrate (111)
B. lead (1V) oxide
C. potassium trioxochlorate (V)
D. potassium trioxochlorate (V)

32. Coal gas is made up to carbon (11) oxide, hydrogen and
A. nitrogen B. air
C. argon D. methane

33. 

In the diagram above, the gas Y could be
A. hydrogen chloride
B. oxygen
C. carbon (1V) oxide
D. chlorine.

34. $2X^-_{(aq)} + MnO2_{(s)} + 4H^+_{(aq)} \longrightarrow X_{2(g)} + Mn^{2+}_{(aq)} + 2H_2O_{(1)}$

The reaction above can be used for the laboratory preparation of all halogens except fluorine because it is

A. a poisonous gas
B. an oxidizing agent
C. electronegative in nature
D. highly reactive.

35. The reaction that occurs during the laboratory test for the presence of tetraoxosulphate (V1)

A. $SO^{2-}_{4(aq)} + Ba^{2+}_{(aq)} \xrightarrow{dilHNO_3} BaSO_4$

B. $Cu_{(s)} + 4H^{+}_{(aq)} + 2SO^{2-}_{4(aq)} \longrightarrow CuSO_4(s) + 2H_2O_{(1)} + SO_{2(g)}$

C. $4H^{+}_{(aq)} + 2SO2\text{-}4(aq) + 2e^{-} \longrightarrow SO^{2-}_{4(aq)} + 2H^2O_{(1)} + SO_{2(g)}$

D. $CuO_{(s)} + 2H^{+}_{(aq)} + SO^{2-}_{4(aq)} \longrightarrow CuSO_{4(aq)} + H_2O_{(1)}$

36. The removal of rust from iron by treatment with tetraoxosulphate (V1) acid is based on the

A. hydrolysis of the iron
B. reaction of acid with base
C. oxidation of the rust
D. dehydration of the iron.

37. Which of the following additives could improve the quality of steel?

A. Silicon B. Sulphur and phosphorus
C. Carbon. D. Chromium and nickel.

38. Sodium hydroxide is prepared commercially from sodium chloride solution by.

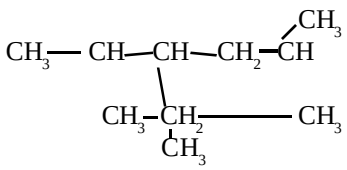
A. electrolysis using mercury as cathode
B. hydrolysis in steam using a catal.yst
C. electrolysis using iron as anode
D. treating sodium chloride with ammonia and carbon (1V) oxide.

39 A sample of a substance containing only C and H burns in excess O_2 to yield 4.4 g of CO_2 and 2.7 g of H_2O. The empirical formular of the substance is

A. CH_3 B. CH_2
C. CH_4 D. C_2H_5
(C= 12, O=16, H= 1)

40. An undesirable paraffin in the petroleum industry which is particularly prone to knocking is

A. iso-octane
B. n-heptane
C. iso-heptane
D. n-octane

41. 

The IUPAC nomenclature of the organic compund with the above structural formular is

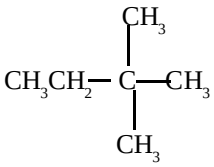
A. 3-ethyl-2, 5-dimethylhexane
B. 4-ethyl-2, 5-dimethylexane
C. 3-ethyl-1, 1, 4-trimethypentane
D. 3-ethyl-2,5,5-trimethypentane

42. The reaction of an alkanol with an alkanoic acid in the presence of concentrated H_2SO_4 will produce an

A. Alkanal
B. Alkanonate
C. Alkanone
D. Alkayne.

43. The final product of the reaction of ethyne with hydrogen iodide is

A. $CH_3 — CHI_2$
B. $CH_2I — CH_21$
C. $CH_3 — CI_3$
D $CH_2=CHI$

44. 

How many more isomers of the compound above can be obtained?

A. 5 B. 4
C. 3 D. 2

45. Synthesis detergents are preferred to soap for laundry using hard water because

A. detergent are water soluble while soap not
B. the calcium salts of detergent are water soluble
C. the magnesium salt of soap is soluble in hard water
D. soap does not have a hydrocarbon terminal chain.

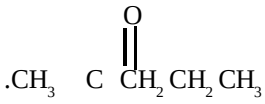
46. The synthetic rubber obtained by the polymerization of chlorobutadiene in the presence of sodium is called

A. Teflon B. Isoprene
C. Polythene D. Neoprene

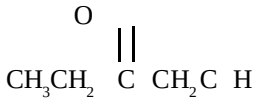
47. $25cm^3$ of 0.02 M KOH neutralized 0.03 g of a monobasic organic acid having the general formula $C_nH_{2n+1}COOH$. The molecular formula of the acid is

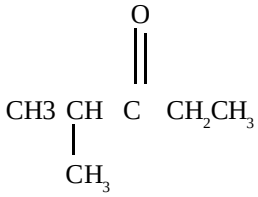
A. HCOOH B. C_2H_5COOH
C. CH_3COOH D. C_3H_7COOH
(C= 12, H=1, 0=16)

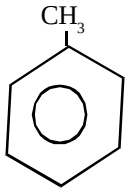
48 When Fehling's solution is added to two isomeric carbonyl compounds X and Y with the molecular formula $C_5H_{10}O$, compound X gives a red precipitate while Y does not react. It can be inferred that X is

A 

B. $CH_3CH_2CH_2CH_2C—H$

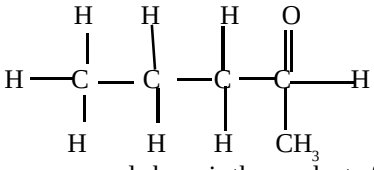
C. 

D. 

49. 

The compound above contains

A. sp^3 hybridized carbon atoms only
B. sp^3 hybridized carbon atoms only
C. sp^3 and sp hybridized carbon atoms
D. sp^3 and sp^2 hybridized carbon atoms.

50. 

The compound above is the product of the oxidation of

A. 2 – methylbutan – 2 - o1
B. 2 – methylbutan –1 - o1
C. 2,3 – dimenthylpropan – 1 – o1
D. Pentan –2 – o1

Chemistry 1998

1. The addition of water to calcium oxide leads to
A. a physical change
B. a chemical change
C. the formation of mixture
D. an endothermic change.

2. A mixture of iron and sulphur can be separated by dissolving the mixture in
A. steam
B. dilute hydrochloric acid
C. dilute sodium hydroxide
D. benzene

3. 8.0 g of an element X reacted with an excess of copper (11) tetraoxosulphate (1V) solution to deposit 21.3 g of copper. The correct equation for the reaction is

A. $X_{(s)} + CuSO_{4(aq)} \rightarrow Cu_{(s)} + XSO_{4(aq)}$
B. $X_{(s)} + 2CuSO_{4(aq)} \rightarrow 2\,Cu_{(s)} + X(SO_4)_{(aq)}$
C. $2X_{(s)} + 2CuSO_{4(aq)} \rightarrow Cu_{(s)} + X_2(SO_4)_{(aq)}$
D. $2X_{(s)} + 3CuSO_{4(aq)} \rightarrow 3Cu_{(s)} + X_2(SO)_{3(aq)}$

4. $C_3H_8(g) + 5O_2(g) \rightarrow 4H_2O(g) + 3CO_2(_G)$

From the equation abovem the volume of oxygen at s.t.p. required to burn 50cm3 of propane is

A. $250cm^3$ B. $150cm^3$
C. $100cm^3$ D. $50cm^3$

5. $30cm^3$ of hydrogen was collected over water at 27°C and 780 mm Hg. If the vapour pressure of water at the temperature of the experiement was 10mm Hgm calcuale the volume of the gas at 760mm Hg and 7°C.

A. $40.0cm^3$ B. $35.7cm^3$
C. $28.4cm^3$ D. $25.2cm^3$

6. A given amount of gas occupies 10.0 dm3 at 4 atm. and 273°C. The number of moles of the gas present is

A. 0.089 mol
B. 1.90 mol
C. 3.80 mol
D. 5.70 mol

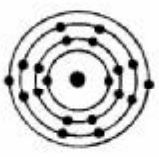
[Molar volume of gas at s.t.p.= 22.4 dm^3]

7. If sulphur oxide and methane are released simultaneously at the opposite ends of narrow tube, the rates of diffusion R_{so2} and R_{CH4} will be in the ratio

A. 4:1 B. 2:1
C. 1:2 D. 1:4

[S=32, O= 16, C=12, H=1]

8. A solid begins to melt when
A. constituent particles acquire a greater kinetic energy
B. energy of vibration of particles of the solid is less than the intermolecular forces
C. Constituent particles acquire energy of the above the average kinetic energy
D. energy of vibration of particles of the solid equals the intermolecular forces.

9. 

The diagram above represents an atom that can combine

with chlorine to form
A. a convalent bond
B. an electrovalent bond
C. a hydrogen bond
D. a co-ordinate bond

10. Which of the following electron configurations indicates an atom with the highest ionization energy?
A. 2, 8, 7 B. 2, 8, 8, 1
C. 2, 8, 8, 2 D. 2, 8, 8, 7

11. The lines observe in the simple hydrogen spectrum are due to emission of
A. electron from the atom
B. energy by proton transition
C. energy by electron transition
D. neutrons from the atom

12 If an element X of atomic number Z and mass number Y is irradiated by an intense concentration of neutrons the relevant nuclear equation is

A. ${}^{y}_{x}X + {}^{1}_{o}n \rightarrow {}^{Y-1}_{Z+1}X$

B. ${}^{Y}_{Z}X + 1_{o}\ n \rightarrow {}^{Y+1}_{Z}X$

C. ${}^{y}_{Z}X + {}^{1}_{o}n \longrightarrow {}^{Y}_{Z+1}X$

D. ${}^{Y}_{Z}X + 1_{o}\ n \longrightarrow {}^{Y+1}_{Z-1}X$

13. The property used in obtaining oxygen and nitrogen industrially from air is the
A. boiling point
B. density
C. rate of diffusion
D. solubility

14. Excess phosphorus was burnt in gas jar and the residual gas passed successively over concentrated KOH solution and concentrated H_2SO_4 before being collected in a flask. The gases collected are
A. carbon (1V) oxide nitrogen and the rare gases
B. nitrogen (1V) oxide and the rare gases
C. nitrogen and the rare gases
D. carbon (1V) oxide nitrogen (1V) oxide and the rare gases.

15. Potassium tetraoxomanganate (v11) is often added to impure water to
A. reduce organic impurities
B. reduce inorganic impurities
C. destroy bacteria and algae
D. remove permanent hardness.

16. The soil around a battery manufacturing factory is likely to contain a high concentration of
A. Ca^{2+} salts B. Pb^{2+} salts
C. Mg^{2+} salts D. AI^{3+} salts.

17. 90.0 g of $MgCI_2$ was placed in 50.0cm^3 of water to give a saturated solution at 298 K. If the solubility of the salt is 8.0-mol dm^{-3} at the same temperature, what is the mass of the salt felt undissolve at the given temperature?
A. 52.0 g B. 58.5 g
C. 85.5 g D. 88.5 g
[Mg = 24, CI=35.5]

18. Soap leather is an example of a colloid in which a
A. Liquid is dispersed in gas
B. Solid is dispersed in liquid
C. Gas is dispersed in liquid
D. Liquid is dispersed in liquid.

19. The pH of a solution obtained by mixing 100cm^3 of a 0.1 M HCI solution with 100cm^3 of a 0.2 M solution of NaOH is
A. 1.3 B. 7.0
C. 9.7 D. 12.7

20. In the conductance of aqueous potassium tetraoxosulphate (1V) solution, the current carriers are the
A. ions B. electrons
C. hydrated ions D. hydrated electrons

21. What volume of 0.1 mol dm^{-3} solution of tetraoxosulphate (1V) acid would be needed to dissolve 2.86 g of sodium trioxocarbonate (1V) decahydrate crystals?
A. 20 cm^3 B. 40 cm_3
C. 80 cm^3 D. 100 cm^3
[H=1, C=12, 0= 16, S= 32, Na =23]

22. 1.2 of electricity are passed through electrolytic cells containing Na^+, Cu^{2+} and AI^{3+} in series. How many moles of each metal would be formed at the cathode of each cell?
A. 0.6 mole of Na, 1.2 moles of Cu and 1.2 moles of AI
B. 1.2 moles of Na, 0.6 mole of Cu and 0.4 mole of AI
C. 1.3 mmoles of Na, 2.4 moles of Cu and 2.4 moles of AI
D. 1.2 moles of Na, 2.4 moles of Cu and 3.6 moles of AI

23. What mass of gold is deposited during the electrolysis of gold (111) tetraoxosulphate (V1)when a current of 15 A is passed for 193 seconds?
A. 1.97 g B. 3.94 g
C. 5.91 g D. 19.70g
[Au = 97, F=96 5000C mol^{-1}]

24. $Fe_{(s)} + Cu^{2+}_{(aq)} \rightarrow Fe^{2+}_{(aq)} + Cu_{(s)}$
From the reaction above it can be inferred that
A. Fe is the oxidizing agent
B. Fe is reduced
C. Cu^{2+} loses electrons
D. Cu^{2+} is the oxidizing agent.

25. $2FeCI2(s) + CI_{2(g)} \longrightarrow 2FeCI_{3(s)}$
The reducing agent in the reaction above is
A. $FeCI_2$ B. CI_2
C. $FeCI_3$ D. Fe

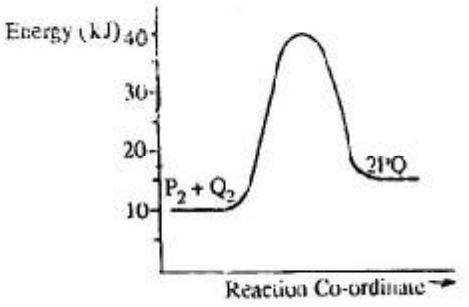
26. The reaction that is accompanied by a decrease in entropy when carried out constant temperature is
A. $N_2O_{4(g)} \rightleftharpoons NO_2$
B. $N_2 + 3H_2 \rightleftharpoons 2NH_3$
C. $CaCO_3 \rightleftharpoons CaO + CO_2$
D. $2N_2H_4 \rightleftharpoons 3N_2 + 4H_2O$

27. 32g of anhydrous copper 11 tetraoxosulphate (1V) dissolved in 1 dm3 of water generated 13.0kJ of heat. The heat of solution is
A. 26.0 kJ mol^{-1} B. 65.0kJ mol^{-1}
C. 130.0kJ mol^{-1} D. 260.0 kJ mol^{-1}

28. $Mg^{2+}_{(ag)} + 2e^-_{(aq)} \rightarrow$ E^o (volts) = -2.370
$Zn^{2+}_{(ag)} + 2e^-_{(aq)} \rightarrow Zn_{(s)}$ E^o (volts) = -0.763
$Cd^{2+}_{(ag)} + 2e^-_{(aq)} \rightarrow Cd_{(s)}$ E^o (volts) = -0.403
$Cu^{2+}_{(ag)} + 2e^-_{(aq)} \rightarrow Cu_{(s)}$ E^o (volts) = +0.403

In the electrochemical series above the strongest reducing agent is
A. $Cu_{(s)}$ B. $Cd_{(s)}$
C. $Zn_{(s)}$ D. $Mg_{(s)}$

29.



In the diagram above, the activation energy for the backward reaction is
A. +5 kJ B. +15 kJ
C. +25kJ D. +30kJ

30. $2X_{(g)} + Y_{(g)} \longrightarrow Z_{(g)}$
In the equation above the rate of formation of Z is found to be independent of the concentration of Y and to quadruple when rate equation for the reaction is
A. $R = k[X][Y]$
B. $R = k[X]^2[Y]$
C. $R = k[X]^2[Y]^2$
D. $R = k[X]^2[Y]^0$

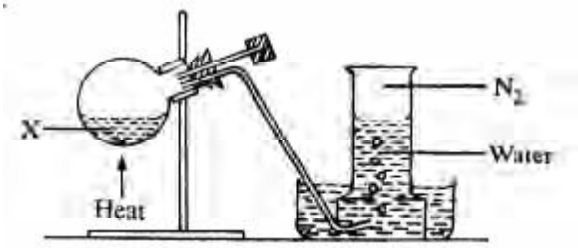
31. $2CI_{2(g)} + 2H_2O_{(g)} \rightleftharpoons 4HCI_{(g)} + O_{2(g)}$ $H^o = +115kJ\ mol^{-1}$
In the above equilibrium reaction a decrease in temperature will.
A. favour the reverse reaction
B. favour the forward reaction
C. have no effect on the equilibrium state
D. double the rate of the reverse reaction

32. $3CuO_{(s)} + 2NH_{3(g)} \longrightarrow 3Cu_{(s)} + 3H_2O_{(1)} + N_{2(g)}$
(i) $2NH_{3(s)} + 3CI_{2(g)} \longrightarrow 6HCI_{(s)} + N_{(1)} + H_2O$
(ii) $4NH_{3(s)} + 3CI_{2(g)} \longrightarrow 6H_2O_{(l)} + 2N_{2(g)} + HCl$
The reactions represented by the equations above demonstrate the
A. basic properties of ammonia
B. acidic properties of ammonia
C. reducing properties of ammonia
D. oxidizing properties of ammonia.

33. A gas that trun a filter paper previously soaked in lead ethanoate solution black is
A. hydrogen chloride
B. hydrogen sulphide
C. sulphur (1V) oxide
D. sulphur (VI) oxide.

34. A solution containing chloride gives a white precipitate with silver trioxonirate (V) solution.
The precipitate will be insoluble in dilute
A. HNO_3 but soluble in ammonia solution
B. HNO_3 and in ammonia solution
C. HCI but soluble in ammonia solution
D. HCI and in ammonia solution.

35.



In the experiment above, X could be a solution of
A. Sodium, trioxonirate (V) and ammonium chloride
B. Sodium trioxonirate (111) and ammonium chloride
C. lead (11) trioxonirate (V) and copper turnings
D. potassium, trioxonirate (V) and copper turnings.

36. The oxide that remains unchanged when heated in hydrogen is
A. CuO B. Fe_2O_3
C. PbO_2 D. ZnO

37. Which of the following is observed when a solution of Iron (111) chloride is mixed with a solution of sodium hydroxide?
A. calcium B. aluminium
C. iron D. zinc

39. A common characteristic shared by iron and aluminum is that both
A. are extracted by reduction methods
B. form only basic oxides
C. show oxidation states of +2 and +3
D. form soluble hydroxides.

40. Alloys are often used in preference to pure metals bacause
A. metals are too hard
B. metals are ductile
C. metallic properties are improved in alloys
D. alloys are a mixture of metals.

41. $CH_3CH_2\underset{OH}{C}HCH(CH_3)_2$

The IUPAC nomenclature for the above compound is
A. 4-methylpentan –3-ol
B. 2-methylpentan –3-0l
C. 3- methylpentan –3 –0l
D. 1,1-dimenthylbutan-2-0l

42. Dehydration of $CH_3\ CH_2\ CH_2\ CH_2\ OH$ gives

A. CH_2 - CH - CH - CH_2 - CH_3
B. CH_3CH- CH - CH_2 - CH_3
C. H - C ≡ C - CH_2 - CH_3
D. CH_3C - C -CH_3

43. $nCH_2 = CH_2\ O_2$ (initiator) ($CH_2\ CH_2\ CH_2$ →

The above equation represents the manufacture of
A. rubber B. polythene
C. polystyrene D. butane

44. One mole of a hydrocarbon contains 6 g of hydrogen. If the molecular weight is 54, the hydrocarbon is an.
A. alkanone B. alkane
C. alkene D. alkyne

45. The products obtained when a pure hydrocarbon is burn in excess oxygen are
A. carbon and hydrogen
B. carbon and water
C. carbon (11) oxide and hydrogen
D. carbon (1V) oxide and water.

46. How many structural isomers can be drawn for the non-cyclic alkanol with molecular formula $C_4H_{10}O$
A. 1 B. 2
C. 3 D. 4

47. On cracking medicinal paraffin, a gas is evolved which gives a pop sound with a lighted splinter and a oily liquid which decolourizes bromine solution is also obtained. The products of the cracking are
A. carbon (1V) oxide and alkyne
B. carbon (11) oxide and alkane
C. hydrogen gas and alkane
D. hydrogen gas and alkane

48. An example of aromatic compound is
A. $CH_6H_{13}OH$
B. $C_6H_{13}CI$
C. C_6H_5OH
D. C_6H_{14}

49. Terylene is synthesized from ethane –1, 2- diol and benzene –1, 4- dicarboxylic acid by
A. addition reaction
B. consensation reaction
C. elimination reaction
D. substitution reaction.

50. Which of the following is true concerning the properties of benezene and hexane?
A. Both undergo subtitution reaction.
B. Both undergo addtion reaction
C. Both are solids
D. Both can decolourize bromine water.

Chemistry 1999

1. 200 cm3 each of 0.1 M solution of lead (11) trioxonirate (V) and hydro chlorioc acid were mixed. Assuming that lead (11) chloride is completely insoluble, calculate the mass of lead (11) chloride that will be precipate.
A. 2.78 g B. 5.56 g
C. 8.34 g D. 11.12 g
[Pb = 207, CI = 35.5, N = 14, O = 16]

2. 56.00cm3 of a gas at s.t.p weighed 0.11 g, What is the vapour density of the gas?
A. 11.00 B. 22.00
C. 33.00 D. 44.00
[Molar volume of a gas at s.t.p = 22.4 dm3]

3. Which of the following gases will diffuse fastest when passed through a porous plug?
A. Propane B. Oxygen
C. Methane D. Ammonia
[H = 1, C = 12, N= 14, O = 16]

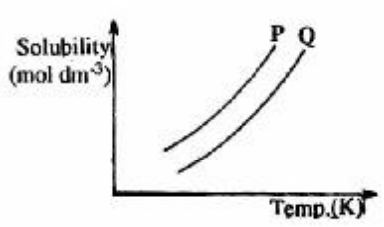
4. Which of the following will have its mass increased when heated in air?
A. Helium B. Magnesium
C. Copper pyrites D. Glass

5. What is the temperature of a given mass of a gas initially O°C and 9 atm, if the pressure is reduced to 3

atmosphere at constant volume?

A. 91 K B. 182 K
C. 273 K D. 819 K

6.



In the diagram above, the mixture of the two solid P and Q can be separated by

A. distillation
B. fractional distillation
C. crystallization
D. fractional crystallization.

7. Mg(s) + 2HCl (aq) ⟶ MgCl2(aq) + H2(g). From the equation above, the mass of magnesium required to react with 250cm3 of .5 M HCl is

A. 0.3 g B. 1.5 g
C. 2.4 g D. 3.0 g
[M = 27, Cl = 35.5]

8. A gaseous metallic chloride MClx consist od 20.22% of M by mass. The formula of the chloride is

A. MCl B. MCl_2
C. MCl_3 D. M_2Cl_6
[M = 27, Cl = 35.5]

9. In which of the following are water molecules in the most disorderly arrangement?

A. Ice at –10°C B. Ice at O°C
C. Water at 100°C D. Steam at 100°C

10. In order to remove one electron from 3s-orbital of gaseous sodium atom, about 496 kJ mol-1 of energy is required. This energy is referred to as

A. electron affinity B. ionization energy
C. activation energy D. electronegativity

11. Nitrogen obtained from the liquefaction of air has a higher density than that obtained from nitrogen containing compounds because the former contains

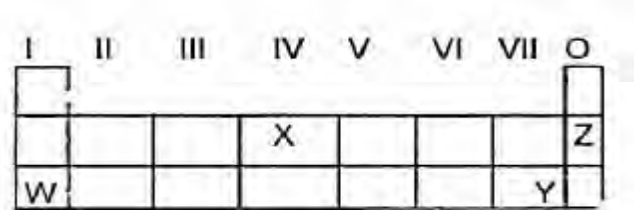
A Water vapour B. Oxygen
C. Carbon (1V) oxide D. Rare gases

Use the table below to answer question 13 and 14.

12. The method that can be used to convert hard water to soft water is

A. Chlorination
B Passage over activated charcoal
C. the use of an ion exchange resin
D. aeration

Use the table below to answer question 13 and 14



13. The element that is likely to participate in covalent rather than ionic bonding is

A. Z B. Y
C. X D. W

14. The least reactive elements is

A. W B. X
C. Y D. Z

15. $ls^2 2s^2 2p^6 3s^2 3p^6 3d^7 4s^2$. An element with the electron configuration above is a

A. non-metal
B. metal
C. transition element
D. group two element

16. Given that electronegativity increases across a period and decreases down a group in the periodic table, in which of the following compounds will the molecules be held together by the strongest hydrogen bond?

A. $HF_{(g)}$ B. $NH_{(g)}$
C. $CH4_{(g)}$ D. $HCl_{(g)}$

17. 0.25 mole of hydrogen chloride was dissolved in distilled water and the volume made up to 0.50dm3. If 15.00cm3 of the solution requires 12.50 cm3 of aqueous sodium trioxocarbonate (1V0 for neutralization, calculate the concentration of the alkaline solution.

A. 0.30 mol dm^{-3} B. 0.40 mol dm^{-3}
C. 0.50 mol dm^{-3} D. 0.60 mol dm^{-3}

18. The correct order of increasing oxidation number of the transition metal ions for the compounds $K_2Cr_2O_7$, V_2O_5 and $KmnO_4$ is

A. $V_2O_5 < K_2Cr_2O_7, < KMnO_4$
B. $K_2Cr_2O_7, < KMnO_4 < V_2O_5$
C. $KMnO_4 < K_2Cr_2O_7, < V_2O_5$
D. $KMnO_4 < < V_2O_5 < K_2Cr_2O_7,$

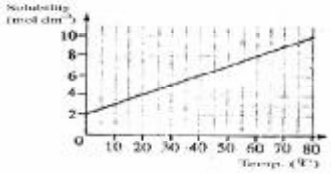
19. The set of pollutants that is most likely to be produced when petrol is accidentally spilled on plastic materials and ignited is

A. CO, CO_2 and SO_2
B. CO, HCl and SO_2
C. CO, CO_2 and HCl
D. SO_2, CO_2 and HCl

20. What is observed when aqueous solution of each of tetraoxosulphate(V1) acid, potassium trioxides (V) and potassium iodine are mixed together?

A. white precipitate is formed
B. a green precipitate is formed
C. The mixture remains colourless
D. The mixture turns reddish-brown.

21.



From the diagram above, the mass of crystals

deposited when 1 dm3 of a saturated solution of NaCl is cooled from 80°C to 60oC is

A. 117.00 g B. 58.50 g
C. 11.70 g D. 5.85 g
[Na = 23, Cl = 35.5]

22. The solution with the lowest pH value is
A. 5 ml of m/n HCl
B. 10 ml of m/n HCl
C. 15 ml of m/n HCl
D. 20 ml of m/n HCl

23. The solubility product of $Cu(lO_3)_2$ is 1.08 x 10-7. Assuming that neither ions react appreciably with water to form H^+ and OH^-, what is the solubility of this salt?
A. 2.7×10^{-8} mol dm^{-3}
B. 9.0×10^{-8} mol dm^{-3}
C. 3.0×10^{-8} mol dm^{-3}
D. 9.0×10^{-8} mol dm^{-3}

24. The entropy and enthalpy of a system are a measure of
A. degree of disorderliness and heat content respectively
B. heat content and degree of disorderliness respectively
C. heat content of a system only
D. degree of disorderliness only.

25. $2SO2(g) + O_2(g) \longleftrightarrow 2NO^2(g)$. In the chemical reaction above, the substance that will increase the rate of production of sulphur (V1) oxide is
A. manganese (1V)oxide
B. finely divided ion
C. vanadium (V0 oxide
D. nickel

26. $N_2O_4(g) \longrightarrow 2NO_2g)$. Increases in total pressure of the equilibrium reaction above will
A. Produce more of $NO_2(g)$ in the mixture
B. Convert all of $N_2O_4(g)$ to $NO_2(g)$
A. Have no effect on the concentrations of $N_2O_4(g)$ and $N_2O_4(g)$
B. Produce more odf $N_2O_4g)$ in th mixture

27. What quantity of electricity will liberate 0.125 mole of oxygen molecules during the electrolysis of dilute sodium chloride solution?
A. 24 125 coulombs
B. 48 250 coulombs
C. 72 375 coulombs
D. 96 500 coulombs
[F = 96 500C mol^{-1}]

28. $X + Y \longrightarrow Z$. The rate equation for the chemical reaction above is $-\frac{\Delta[X]}{\Delta t} = [X]^2[Y]$
The overall order of the reaction is
A. 0 B. 1
C. 2 D. 3

29. When a current 1 was passed through an electrolyte solution for 40 minutes, a mass Xg of a univalent metal was deposited at the cathode. What mass of the metal will be deposited when a current 21 is passed through the solution for 10 minutes?
A. x/4 g B. x/2 g
C. 2X g D. 4X g

30. $RS_{(aq)} + HF_{(aq)} \longrightarrow RF_{(s)} + HS_{(aq)}$ $\Delta H = -65.7$ kJ mol^1. From the equation above, it can be deduced that.
A. the heat content of the reactants is lower than that of the reactants ucts
B. the heat content of the reactants is higher than that of the products
C. the reaction is slow
D. a large amount of heat is absorbed.

31. Which of the following statements is true of the electrochemical series?
A. Electropositivity of metals increase down the series
B. Electropositivity of non-metals decrease down the series
C. Electronegativity of non-metals increase down the series
D. Electropositivity of metal decreases down the series

32. The gas that will form a white precipitate with acidified silver trioxonirate (V) is
A. NH_3 B. SO_2
C. CO_2 D. HCl

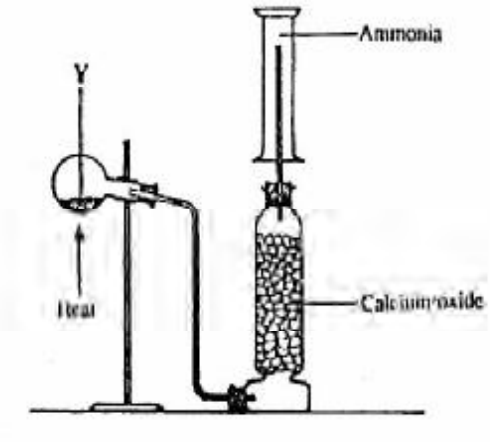
33. Chlorine bromine and iodine resemble one another in that they
A. dissolve in alkalis
B. react violently with hydrogen without heating
C. are liquids
D. displace one another from solutions of their salts.

34. The salt that reacts with dilute hydrochloric which decolourizes acidified purple smelling gas which decolourizes acidified purple potassium tetraoxomanganate(V11) solution is
A. Na_2SO_4 B. Na_2SO_3
C. Na_2S D. Na_2CO_3

35. A pair of compounds that can be used to generate a gas which physiological effect on human beings is
A. sodium trioxonirate(V) and calcium chloride
B. sodium dioxonitrate (111) and ammonium chloride
C. sodium trioxonirate(V) an ammonium chloride
D. sodium dioxonitrate (11l) and potassium chloride.

36. Hydrogen is used in oxy-hydrogen flames for melting metals because it
A. evolves a lot of heat when burnt
B. combines explosively with oxygen
C. is a very light gas
D. is a rocket fuel.

37.



In the diagram above Y is mixture of
A. Calcium hydroxide and ammonium chloride
B. Calcium hydroxide and sodium chloride(V)
C. Sodium chloride and ammonium trioxonirate(V)
D. Sodium dioxonitrate(lll) and ammonium chloride.

38. What properties of duralumin make it more useful than its constituent metals?
A. it is heavy with a high melting point
B. it is malleable and has high density
C. it is strong and light
D. it is hard and ductile

39. The pair of metals in the reactivity series that are usually extracted by the electrolysis of their ores is
A. Magnesium and zinc
B. Magnesium and calcium
C. Copper and zinc
D. Lead and calcium

40. A metal that can be extracted from cassiterite is
A. calcium B. magnesium
C. tin D. copper

41. Which of the following metals is passive to concentrated trioxonirate(V) acid?
A. iron B. tin
C. copper D. zinc

42. The hydrocarbon the burns in air with a sooty flame is
A. C_6H_6 B. C_3H_6
C. C_4H_{10} D. C_6H_6

43. 2-methylprop-1-ene is an isomer of
A. but-2-ene
B. pent-l-ene
C. 2-methylbut-ene
D. 2-methylbut-l-ene

44. Which of the following is a solvent for perfumes?
A C_5H_{12} B. C_4H_6
C. CH_3COOH D. C_2H_5OH

45. When excess ethanol is heated to 145oC in the presence of concentrated H_2SO_4 the product is
A. ethyne
B. diethyl sulphate
C. diethyl ether
D. acetone

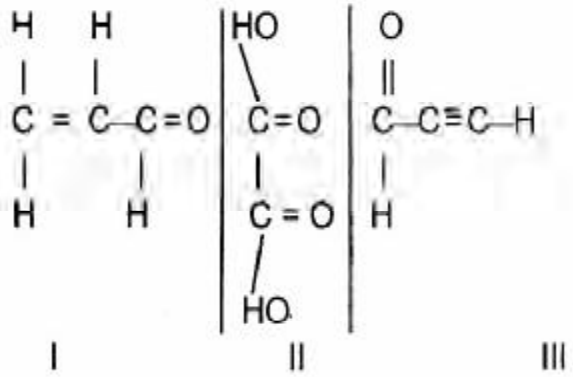
46. How many grammes of bromine will saturate 5.2 g of but-l-ene-3-yne?
A. 64.0 g B. 48.0 g
C. 32.0 g D. 16.0 g
[C = 12, H= 1, Br = 80]

47. Polyvinyl chloride is used to produced
A. bread B. pencils
C. ink D. pipes

48. An organic compound that does not undergo a reaction with both hydrogen cyanide and hydroxylamine can be an
A. alkenes B. alkanal
C. alkanone D. Alkanoic acid

49. When two end alkyl groups of ethyl ethanoate are interchanged, the compound formed is known as
A. methylethanoate
B. ethyl propionate
C. methylpronoste
D. propel ethanoate.

50.



Which of the compounds above would react to take up two molecules of bromine during bromination?
A. 1 only
B. 111 only
C. 1 and 11 only
D. 11 and 111 only

Chemistry 2000

1. A mixture of iodine and sulphur crystals can be separated by treatment with
   A. water of filter off sulphur
   B. carbon (1V) sulphide to filter off iodine
   C. ethanoic acid to filter off sulphur
   D. methanol to filter off iodine

2. Sieving is a technique used to separate mixtures containing solid particles of
   A. small sizes B. large sizes
   C. different sizes D. the same size

3. Which of the compounds is composed of Al, Si, O and H?
   A. Epson salt B. Limestone
   C. Clay D. Urea

4. $50cm^3$ of carbon (11) oxide was exploded with $150cm^3$ of air containing 20% oxygen by volume, which of the reactants was in excess?
   A. Carbon (11) oxide
   B. Carbon (1V) oxide
   C. Oxygen
   D. Nitrogen

5. How many moles of HCl will be required to react with potassium heptaoxodichromate (V1) to produce 3 moles of chlorine?
   A. 14 B. 12
   C. 11 D. 10

6. The ratio of the initial to the final pressure of a given mass of gas is 1:1:5. Calculate the final volume of the gas if the initial volume was 300cm3 at the same temperature.
   A. $120\,cm^3$ B. $200\,cm^3$
   C. $450\,cm^3$ D. $750\,cm^3$

7. The partial pressure of oxygen in a sample of air is 452mm Hg and the total pressure is 780mmHg. What is the mole fraction of oxygen?
   A. 0.203 B. 0.579
   C. 2.030 D. 5.790

8. The fundamental difference between the three states of matter is the
   A. shape of their particles
   B. number of particles in each state
   C. shape of the container they occupy
   D. degree of movement of their particles

9. Which of the following the following statements is correct about the periodic table?
   A. Element in the same period have the same number of valence electrons
   B. The valence electrons of the elements in the same period increase progressively across the period
   C. Elements in the same group have the number of electron shells
   D. The non-metallic properties of the elements tent to decrease across each period

10. The electron configuration of $_{22}X^{2+}$ ion is
    A. $ls^2\ 2s^2\,2p^6\,3s^2\,3p^6\,4s^2\,3d^2$
    B. $ls^2\ 2s^2\ 2p^6\,3s^2\,3p^6\,4s^2\,3d^1$
    C. $ls^2\ 2s^2\,2p^6\,3s^2\,3p^6$
    D. $ls^2\ 2s^2\ 2p^6\,3s^2\,3p^6\,4p^2$

11. Which of the following types of bonding does not involves the formation of new substance?
    A. Metallic B. Covalent
    C. Co-ordinate D. Electrovalent

12. The knowledge of half-life can be used to
    A. create an element
    B. detect an element
    C. split an element
    D. irradiate an element

13. The shape of CO_2,H_2O and CH_4 respectively are
    A. bent linear and tetrahedral
    B. bent tetrahedral and linear
    C. linear bent and tetrahedral
    D. tetrahedral, linear and bent.

14. The distance between the nuclei of chlorine atoms in a chlorine molecule is 0.914 nm. The atomic radius of chlorine atom is
    A. 0.097 nm
    B. 0.914 nm
    C. 2.388 nm
    D. 2.388 nm

15. The noble gas, argon, is used for
    A. electric are welding
    B. welding brass
    C. underwater welding
    D. steal welding

16. A side effect of soft water is that
    A. it gives offensive taste
    B. excess calcium s precipitate
    C. it attacks lead contained in pipes
    D. it encourages the growth of bacteria

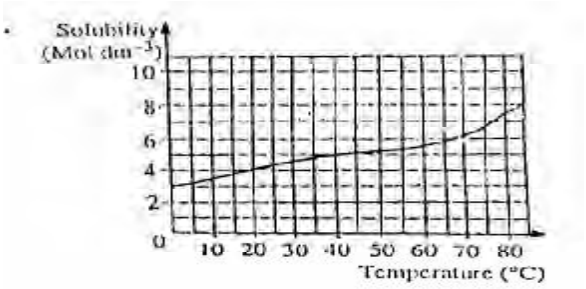
17 Water molecules can be ligands especially when they are bonded to.
    A. alkaline earth metals
    B. alkali metals
    C. transition metals
    D. group V11 elements

18. The air pollutant unknown in nature is
    A. NO B. CO
    C. HCHO D. DDT

19. $10dm^3$ of distilled water used to wash 2.0 g of a precipitate of AgCl. If the solubility product of AgCl is 2.0×10^{-10} $moldm^{-6}$, what quantity of silver was lost in the process?
A. 2.029×10^{-3} mol dm^{-3}
B. 1.414×10^{-3} mol dm^{-3}
C. 2.029×10^{-5} mol dm^{-3}
D. 1.414×10^{-5} mol dm^{-3}

20. Hydration of ions in solution is associated with
A. absorption of heat
B. reduction of heat
C. conduction of heat
D. liberation of heat

21.



The diagram above is the solubility curve of solute, X. Find the amount of X deposited when 500cm3 of solution of X is cooled from 60°C to 20°C
A. 0.745 mole B. 0.950 mole
C. 2.375 moles D. 4.750 moles.

22. $HCl_{(aq)} + H_2O_{(1)} \longleftrightarrow H_3O^+_{(aq)} + Cl^-_{(aq)}$
In the reaction above, $Cl^-_{(aq)}$ is the
A. Conjugate acid
B. Acid
C. Conjugate base
D. Base.

23. In which order are the following salts sensitive to light?
A. AgI ›AgCl ›AgBr
B. AgCl ›AgI ›AgBr
C. AgBr ›AgCl ›AgI
D. AgCl ›AgBr ›AgI

24. Thee pOH of a solution of 0.25 mol dm^{-3} of hydrochloric acid is
A. 12.40 B. 13.40
C. 14.40 D. 14.60

25. $MnO_{4(aq)} + 8H^+_{(aq)}$ '! $Mn^{2+}(aq) + 4H_2O_{(1)}$
Y in the equation above represents
A. 2^{e-}
B. 3^{e-}
C. 5^{e-}
D. 7^{e-}

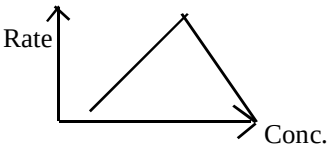
26. $\frac{1}{2}Zn^{2+}_{(aq)} + e^- \longrightarrow \frac{1}{2}Zn_{(s)}$
In the reaction above, calculate the quantity of electricity required to discharge zinc
A. 0.965×10^4 C B. 4.820×10^4 C
C. 9.650×10^4 C D. 48.200×10^4 C
[F = 96 500 C mol^{-1}]

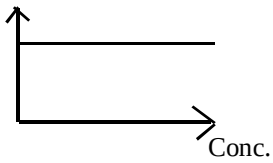
27. Given that M is the mass of substance deposited in an electrolysis and Q the quantity of electricity consumed, then Faraday's law can be written as
A. $M = \frac{Z}{Q}$
B. $M = \frac{Q}{Z}$
C. $M = \frac{Z}{2Q}$
E. $M = QZ$

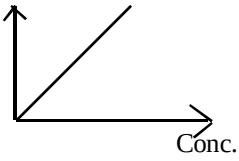
28 0.46g of ethanol when burned raised the temperature of 50 g water by 14.3 K. Calculate the heat of combustion of ethanol.
A. +3 000 kJ mol^{-1}
B. +300 kJ mol^{-1}
C. -300 kJ mol^{-1}
D. -3 000 kJ mol^{-1}
[C = 12, O = 16, H = 1]
Specific heat capacity of water = 4.2 $jg^{-1}K^{-1}$

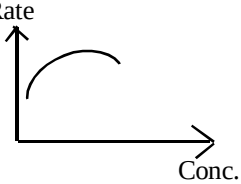
29. Powdered marble reacts with hydrochloric acid solution than the granular form because the powdered form has
A. more molecules
B. more atoms
C. large surface are
D. relatively large mass

30. The graph that describes a zero order reaction is

A.


B.


C.


D.


31. A. increase the quantity of N_2
B. increase the yield of NO
C. decrease the yield of NO
D. decrease the quantity of O_2

32. For a reaction in equilibrium, the species involved in the equilibrium constant expression are
A. gaseous and solid species
B. liquid and solid species
C. solid and dissolved species
D. gaseous and dissolved species

33. A phenomenon where an element exists in different forms in the same physical state is known as
A. isomerism B. amorphism
C. allotropy D. isotropy

34. The substance often used for vulcanization of rubber is
A. chlorine
B. hydrogen peroxide
C. sulphur
D. tetraoxosulphate (V1) acid

35. A gas that is not associated with global warming is
A. CO_2 B. SO_3
C. CH_4 D. H_2

36. The refreshing and characteristics taste of soda water and other soft drinks is as a result of the presence in them of
A. carbon(1V)oxide
B. carbon(11) oxide
C. soda
D. glucose

37. A form of carbon used for absorbing poisonous gases and purification of noble gases is
A. wood charcoal'
B. animal charcoal
C. carbon fibres
D. carbon black.

38. Synthesic gas is a mixture of
A. CH_4 and H_2O
B. CH_4 and H_2
C. CO_2 and H_2
D. CO and H_2

39. Potassium vapour burns with a
A. blue-flame
B. brick-red flame
C. violet flame
D. golden-yellow flame

40. A common characteristics of copper and silver in their usage as coinage metals is that they
A. have high metallic lustre
B. are not easily oxidized
C. are easily oxidized
D. are not easily reduced

41. Haematite is an ore of
A. Zinc B. Lead
C. Iron E. copper.

42. The least easily oxidized of the metals below is
A. Ca B. Na
C. Zn D. Al

43. The repeating unit in natural rubber is
A. alkynes
B. isoprene
C. n-propane
D. neoprene

44. Unsaturated organic compounds are identified by decolourization of.
A. silver bromide and potassium tetraoxomanganate(v11) solution
B. bromine water and acidified potassium tetraoxomanganate(V11) solution
C. silver bromine solution and bromine water
D. bromine water and alkaline potassium tetraoxomanganate (V11) solution.

45. The conditions necessary for thee extraction of a water molecule form two molecules of ethanol are.
A. less acid and a lower temperature
B. excess acid and a lower temperature
C. excess acid and a higher temperature
D. less acid and a higher temperature.

46. The chlorinated alkane often used industrially to remove grease is
A. tetrachloromethane
B. chloromethane
C. trichloromethane
D. dichloromethane.

47. The reaction of carbide with water gives
A. ethyne B. ethane
C. ethane D. Ethanal

48. CH_3-CH_2-C(=O)-OCH_2CH_3
The compound above is an
A. ether B. ester
C. alkanal D. alkanol

49. Alkanone are generally obtained by the oxidation of
A. primary alkanols
B. secondary alkanols
C. tertiary alkanols
D. alkanoic acid

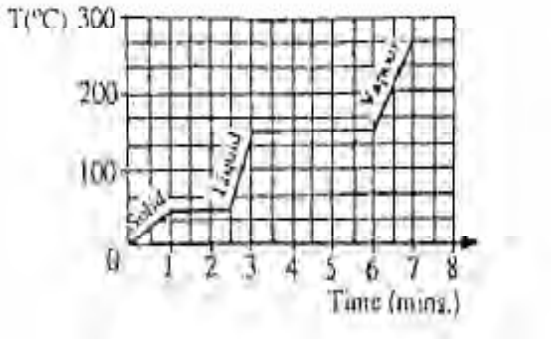
50. Sucrose is made up to
A. glucose and glucose
B. glucose and fructose
C. fructose and fructose
D. galactose and glucose.

Chemistry 2001

1. $25cm^3$ of a gas X contains Z molecules at 15°C and 75 mm Hg. How many molecules will $25cm^3$ of another gas Y contain at the same temperature and pressure?
A, 2Y, B. 2Z. C. Y, D. Z.

2. What mass of water is produced when 8.0g of hydrogen reacts with excess oxygen?
A. 72.0g, B. 36.0g, C. 16.0g, D. 8.0g

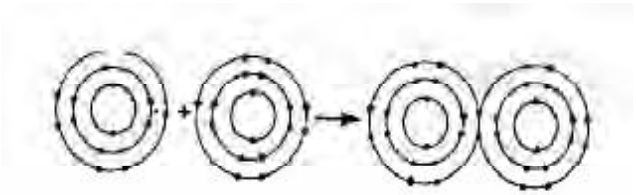
Use the graph below to answer questions 3 and 4



3. How long does it take all the solid to melt?
A. 6.0mins, B. 3.0mins,
C. 2.5mins, D. 1.0min

4. If the gas is cooled, at what temperature will it start to condense?
A. 175°C, B. 250°C,
C. 125°C, D. 150°C

5. Four elements W,X,Y and Z have atomic numbers 2,6,16 and 20 respectively. Which of these elements is a meal?
A. X, B. Z,
C. W, D. Y



6. The diagram above represents the formation of
A. a metallic bond, B. a covalent bond,
C. an electrovalent bond.
D a coordinate covalent bond

7. An element X with relative atomic mass 16.2 contains two isotopes $^{16}_{8}X$ with relative abundance of 90% and $^{m}_{8}X$ with relative abundance of 10%. The value of m is
A. 14, B. 12,
C. 18, D. 16

8. Cancerous growth are cured by exposure to
A. x-rays, B. betta-rays,
C. alpha-rays, D. gamma-rays

9. Which of the following statement is correct about the average kinetic energy of the molecules of a gas?
A. it increases with increase in pressure,
B. it increases with increase in temperature,
C. It increases with increase in volume,
D. It increases at constant pressure.

10. Millikan's contribution to the development of atomic theory is the determination of
A. positive rays, B. cathode rays,
C. charge to mass ratio , D. charge on electron.

11. A particle that contains 9 protons, 10 neutrons and 10 electrons is
A. positive ion B.neutral atom of a metal
C. neutral atom of a non-metal
D. negative ion.

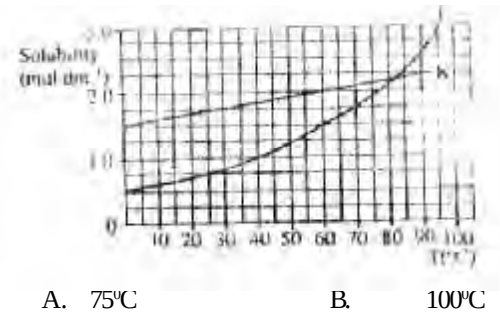
12. An oxide XO_2 has a vapour density of 32. What is the atomic mass of X?
A. 20
B. 32
C. 14
D. 12

13. The chemical used for coagulation in water purification is
A. copper tetraoxosulphate (VI)
B. sodium tetraoxosulphate (VI)
C. aluminium tetraoxosulphate (VI)
D. calcium tetraoxosulphate (VI)

14. Environment pollution is worsened by the release from automobile exhausts of
A. heavy metals B. water vapour
C. smoke D. steam

15. Phosphorus is stored under water to prevent it from
A. smelling B. dehydrating
C. catching fire D. becoming inert

16. Pure solvents are obtained by
A. evaporation B. extraction
C. condensation D. distillation

17. 

d K

A. 75°C B. 100°C
C. 90°C D. 82°C

18. If 1 dm^3 of a saturated solution of L at 60°C is cooled to 25°C, what amount in mole will separate?
A. 0.25 B. 0.50
C. 0.75 D. 1.00

19. Deliquescent substance are used for
A. drying B. melting
C. wetting D. cooling

20. What is the decrease in volume of air when pyrogallol is shaken with 30.00cm^3 of air?
A. 0.63cm^3 B. 0.06cm^3
C. 15.00cm^3 D. 6.30cm^3

21. The pollution from petroleum spillage in rivers and takes can best be dispersed by
A. passing of ships through the area
B. pouring detergents
C. pouring organic solvents
D. evaporation

22. $3Cu(s) + 8HNO_3(aq) \rightarrow 3Cu(NO_3)_2(aq) + 4H_20(i) + 2NO(g)$
In the equation above, copper is
A. a base
B. an oxidizing agent
C. a reducing agent
D. an electron acceptor.

23. NH3(g) + HCI(g) '! NH4CI(s)
The entropy change in the system above is
A. zero B. indeterminate
C. positive D. negative

24. What current in amperes will deposit 2.7g of aluminum in 2 hours?
A. 32 B. 16
C. 8 D. 4
{AI= 27, F 96 500C mol^{-1}

25. $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$
The equilibrium constant for the reaction above is increased by
A. increasing the pressure of the system
B. increasing the temperature of the system
C. increasing the surface area of the vessel
D. the addition of a catalyst to the system

26. As the concentration of an electrolyte reduces, the conductivity
A. decreases B. increases
C. reduces to zero D. is unaffected.

27. $C(s) + 2S(g) \rightleftharpoons CS_2 \quad H = 89kJmol^{-1}$
The chemical equation above implies that
A. 89kJ of energy is absorbed
B. each of carbon and sulphur has 89 kJ of energy
C. both carbon and sulphur contribute 89kJ of energy
D. 89 kJ of energy is released

28. Which of the following best explains the increase in the rate of a chemical reaction as the temperature rises?
A. A lower proportion of the molecules has the necessary minimum energy to react
B. The bonds in the reacting molecules are more readily broken
C. The collision frequency of the molecules increases
D. The molecular collisions become more violent.

29. In which of the following reaction have the oxidation number of nitrogen increased?
A. $2NO(g) + Br_2(l) \rightarrow 2NOBr(1)$
B. $FeSO4(aq) + NO(g) \rightarrow Fe(NO)SO_4(s)$
C. $2NO(g) + CI_2(g) \rightarrow 2NOCI(l)$
D. $2NO(g) + O_2(g) \rightarrow 2NO_2(g)$

30. $P_{(g)} + Q_{(g)} \rightleftharpoons 3R_{(s)} + S_{(g)}$
which of the following will increase the yield of R?
A. Removing some S
B. Using a larger closed vessel
C. Adding a positive catalyst
D. Increasing the temperature

31 Ethanoic acid is
A. tribasic B. unionizeable
C. dibasic D. monobasic

32. A metal M displaces zinc from zinc chloride solution. This shows that
A. M is more electronegative than zinc
B. Zinc is above hydrogen in the series
C. Electron flow from zinc to M
D. M is more electropositive that zinc

33. In which of the following reactions does reduction take place?
A. $2O^{2-} \rightarrow O^2 + 4e^-$
B. $Fe^{2+} - e \rightarrow Fe^{3+}$
C. $2H^{+} \rightarrow H_2$
D. $Cr - 2e^{-} \rightarrow Cr^{2+}$

34. When H is negative, a reaction is said to be
A. Endothermic B. Exothermic
C. Rerverisble D. Ionic.

ethyne?

A. sp B. sp^3
C. sp^2d D. sp^2

36. Protein in acid solution undergo
A. Polymorphism
B. Hydrolysis
C. Fermentation
D. Substitution

37. Fermentation is the
A. breaking down of carbohydrate to glucose
B. breaking down of sugar to carbohydrate
C. conversion of sugar to alcohol in the presence of yeast
D. conversion of alcohol to sugar in the presence of yeast.

38. Catalytic hydrogenation of benzene produces
A. Cyclohexene B. Oil
C. Margarine D. Cyclohexane.

39. A characteristics reaction of the compounds with the general formula C_n2_n is
A. Substitution B. Esterification
C. Decarboxylation D. Polymerization

40. When chlorine is passed into water and the resulting solution exposed to sunlight, the products formed are
A. Chlorine gas and hydrogen
B. Hydrochloric acid and oxygen
C. Chlorine gas and oxochlorate (1) acid
D. Oxygen and oxochlorate (1) acid

41. The pair of organic compounds that are isomers is
A. But – 1-ene and but – 2-ene
B. Ethanol and propanone
C. Trichlorometheane and tetrachloromethane
D. Benzene and methylbenzene

42. $C_{12}H_{22}O_{(s)} + H_2SO_{4(aq)} \longrightarrow 12C_{(s)} + 11H_2O_{(l)} + H_2SO_{4(aq)}$
In the reaction above, tetraoxosulphate (VI) acid function as
A. a reducing agent B. a catalyst
C. a dehydrating agent D. an oxidizing agent

43. During the vulcanization of rubber sulphur is added to
A. lengthen the chain of rubber
B. break down rubber polymer
C. act as a catalyst
D. bind rubber molecules together

44. When sodium reacts with water, the resulting solution is
A. Alkaline B. Acidic
C. Neutral D. Weakly acidic.

45. The general formula for the alkanals is
A. $RCOOR^1$ B. R_1CO
C. RCHO D. ROH

46. Which of the following metals burns with a brick red flame?
A. Ca B. Na
C. Mg D. Pb

47. The gas that can best be collected by downward displacement of air is
A. Chlorine B. Sulphur (IV) oxide
C. Carbon (IV) oxide D. Ammonia.

48. A trihydric alkanol is
A. Phenol B. Glycol
C. Glycerol D. Ethanol

49. The main impurity in iron ore during the extraction of iron is
A. Calcium trioxosilicate
B. Silicon (IV) oxide
C. Sulphur (II) oxide
D. Carbon (IV) oxide.

50. A burning candle produces water and
A. carbon (IV) oxide
B. carbon (IV) oxide
C. oxygen
D. hydrogen.

Chemistry 2002

B. molecular formula
C. structural formula
D. general formula

2. Which of the following gases contains the least number of atoms at s.t.p?
A. 7 moles of argon
B. 4 moles of chlorine
C. 3 moles of ozone
D. 1 mole of butane

3. The chromatographic separation of ink is based on the ability of the components to
A. empirical formula
A. dissolve in each other in the column
B. move at different speeds in the column
C. react with the solvent
D. react with each other.

4. A compound contain 31.91% potassium, 28.93% chlorine and the rest oxygen. What is the chemical formula of the compound?
A. KClO B. $KClO_2$
C. $KClO_3$ D. $KClO_4$

5. A little quantity of trichloromethane (b.pt.60°C) was added to a large quantity of ethanol ((b.pt.78°C). The most probable boiling point of the resultant mixture is from.
A. 60°C - 78°C B. 69°C – 70°C

C. 70°C - 74°C D. 82°C - 84°C

6. The gas that gives brown colouration in brown ring test is
A. CO B. NO
C. CO_2 D. NO_2

7. Which of the following gives a precipitate when treated with NaOH solution?
A. NH_4Cl B. Na_2CO_3
C. $AlCl_3$ E. CH_3COONa

8. The reaction of an alkene with hydrogen in the presence of a catalyst is
A. a nucleophilic reaction
B. an addition reaction
C. a substitution reaction
D. an oxidative reaction

9. A rock sample was added to cold dilute HNO_3. The gas evolved was passed into a solution of acidified $K_2Cr_2O_7$ and the solution turned green.
The rock sample contains.
A. SO_4^{2-} B. SO_3^{2-}
C. NO^{3-} D. Cl^-

10. The intermediate product formed when ethanol is progressively oxidized to ethanoic acid with potassium heptaoxodichromate (V1) is
A. methanal B. propanal
C. ethanal D. butanal

11. CH_3

CH_3CH_2--C-H

OH

The compound above is a
A. primary alkanols
B. secondary alkanols
C. tertiary alkanols
D. glycol

12, A red precipitate of copper (1) carbide is formed when ammonium solution copper (1) chloride is introduced into.
A. CH_3 - C =C -CH_3
B. CH_3 -CH_2 -C a= CH_3
C. CH_2 =CH - CH_2 CH_3
D CH_3CH_2 CH_2 CH_3

13. The most important use of hydrogen is in the
A. manufacture of methyl alcohol
B. manufacture of ethyl alcohol
C. hydrogenation of oils
D. manufacture of ammonia

14. Which of the following polymers is suitable for packaging and electrical insulation?
A. Polyethene B. Polystyrene
C. Polyamide D. Polycarbonate.

15. The boiling of fat and aqueous caustic soda is referred to as.
A. acidification B. hydrolysis
C. saponification D. esterification.

16. Ordinary glass is manufactured from silica, $CaCO_3$ and
A. $NaHCO_3$ B. K_2SO_4
C. K_2CO_3 D. Na_2CO_3

17. OH

CH_3- C-CH_2-CH_3

CH_3

The major product of the dehydration of the compound above is
A H

CH_3- C-CH_2-CH_3

CH_3

B. CH_3- C= CH_2-CH_3

CH_3

C. CH_3 - CH-CH-CH_{23}

CH_3

D. $CH_3CH_2CH_2CH_3$

CH_2

18. The number of isomers formed by C_6H_{14} is
A. 2 B. 3
C. 4 D. 5

19. Which of these pairs are synthetic and natural macromolecules respectively?
A. Nylon and polyethylene, creatine and haemoglobin
B. Nylon and creative, polyethylene and haemoglobin
C. Polyethylene and creatine, nylon and haemoglobin
D. Haemoglobin and nylon, creatine and polyethylene

20. An example of an element that can catenate is
A. nitrogen B. chlorine
C. carbon D. bromine

21. Ethanol can easily be produced by
A. distillation of starch solution
B. catalyst oxidation of methane
C. destructive distillation of wood
D. fermentation of starch.

22. Hydrogen is readily released when dilute hydrochloric acid reacts with
A. Ag B. Au
C. Cu D. Na

23. Which of the following statement is true of a proton?
A. The mass of a proton is 1.0008 g
B. The mass of a proton is
C. The mass of proton is 1840 times the mass of an electron
D. The total mass of the proton in a particular nucleus is always half the nucleus is always half the nuclear mass.

24. $^{14}_{6}C$ X + B
X in the equation above represents.
A. $^{14}_{7}N$ B. $^{13}_{6}C$
C. $^{12}_{6}C$ D. $^{12}_{5}B$

25. A gas X diffuses twice as fast as gas Y under the same condition. If the relative molecular mass of X is 28, calculate the relative molecular mass of Y
A. 14 B. 56
C. 112 D. 120

26. Which of the following chlorides would exhibit the least ionic character?
A. LiCl B. $MgCl_2$
C. $CaCl_2$ D. $AlCl_3$

27. A fixed mass of gas has a volume of 92 cm^3 at 3°C. What will be its volume at 18°C if the pressure remains constant?
A. 552.0 cm^3 B. 97.0 cm^3
C. 87.3 cm^3 D. 15.3 cm^3

28. The processes which return carbon(1V) oxide to the atmosphere include
A. Photosynthesis, respiration and transpiration
B. Respiration, decay and combustion
C. Photosynthesis, decay and respiration
D. Ozone depletion, combustion and decay.

29. The postulate of Dalton's atomic theory which still hold is that
A. all element are made of small indivisible particles
B. particles of different elements combine in a simple whole number ration
C. atoms can neither be created nor destroy ed
D. the particles of the same element are exactly alike

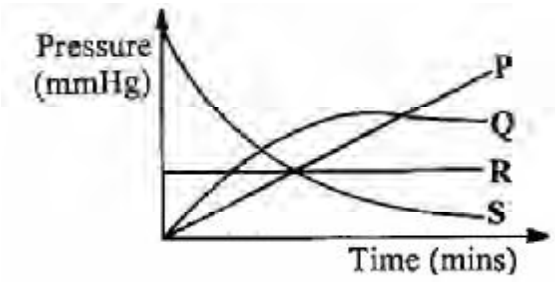
30. If 0.75 mole of cyclopropane and 0.66 mole of oxygen are mixed in a vessel with a total pressure of 0.7 atmosphere, what is the partial pressure of oxygen in the mixture?
A. 0.22 atmosphere
B. 0.33 atmosphere
C. 0.44 atmosphere
D. 0.55 atmosphere

31. When H_2S is passed into a solution of iron (iii) chloride, the solution turns
A. brown B. pale green
C. colourless D. pale red.

32. Which of the following equations shows that a reaction is in equilibrium?
A. G = H – T S
B. G < O
C. G = O
D. G > O

33. $Cu_2S_{(s)} + O_{2(g)}$ $2Cu_{(s)} + SO_{2(g)}$
What is the change in the oxidation number of copper in the reaction above?
A. 0 to +2
B. 0 to +1
C. +1 to 0
D. +2 to +1

34.



; the
on of

C. R
D. S
E.

35. In the reaction E + F G + H, the backward reaction is favoured if the concentration of
A. E is reduced
B. G is reduced
C. F is increases
D. E is increased

36. The products of the electrolysis of dilute sodium hydroxide using platinum electrodes are
A. sodium metal and oxygen gas
B. hydrogen and oxygen gases
C. water and hydrogen gas
D. water and sodium metal

37. $PCl_{5(g)}$ $PCl_{3(g)} + Cl_{2(g)}$
In the reaction above, a decrease in pressure will
A. increase the yield of PCl_3
B. increase the yields of PCl_5
C. accelerate the reaction
D. decelerate the reaction

38. The Arrhenius equation expresses the relationship between the speed of a reaction and its
A. catalyst
B. activation energy
C. molecular collisions
D. heat of reaction

39. What amount of mercury would be liberated if the same quantity of electricity that liberated 0.65 g of zinc is supplied?
A. 8.04 g B. 4.02 g
C. 2.01 g D. 1.00 g
[Zn = 65, Hg = 201]

40. When dissolved in water, NaOH flakes show
A. a rapid reaction
B. a slow reaction
C. an exothermic change
D. an endothermic change

41. Steam changes the colour of anhydrous cobalt (11) chloride from
A. blue to white B. white to green
C. blue to pink D. white to red

42. Which of the following solutions containing only hydroxyl ions will liberate hydrogen gas when reacted with magnesium metal?
A. 1.0×10^{-12} mol dm^{-3} B. 1.0×10^{-6} mol dm^{-3}
C. 1.0×10^{-4} mol dm^{-3} D. 1.0×10^{-2} mol dm^{-3}

43. The solubility of a salt of molar mass101 g at 20°C is 0.34mol dm^{-3}. If 3.40 g of the salt is dissolved completely in 250 cm^3 of water in beaker, the resulting solution is
A. saturated B. unsaturated
C. supersaturated D. a suspension.

44. 25 cm^3 of a 0.2mol dm^{-3} solution of Na_2CO_3 requires 20cm^3 of a solution of HCl for neutralization. The concentration of the HCl solution is
A. 0.2 mol dm^{-3} B. 0.4 mol dm^{-3}
C. 0.5 mol dm^{-3} D. 0.6 mol dm^{-3}

45. When a salt loses its water of crystallization to the atmosphere exposure, the process is said to be
A. effervescence B. efflorescence
C. fluorescence D. deliquescence

46. Three drops of 1.0 mol dm^{-3} solution of NaOH are added to 20 cm^{-3} of a solution of pH 8.4. The pH of the resulting solution will be
A. less than 8.4 B. greater than 8.4
C. unaltered D. close to that of pure water.

47. Tetraoxosulphate (Vl) acid burns the sk9in by
A. dehydration B. hydrolysis
C. hydration D. heating

48. The substance least considered as a source of environmental pollution is
A. uranium
B. lead compounds
C. organphosphourous compounds
D. silicate minerals.

49. The property which makes alcohol soluble in water is the
A. ionic character
B. boiling point
C. covalent nature
D. hydrogen bonding

50. The furring of kettles is caused by the presence in water of
A. calcium hydrogentrioxocarbonate (1V)
B. calcium trioxocarbonate(1V)
C. calcium tetraoxosulphate (V1)
D. calcium hydroxide

Chemistry 2003

1. What volume of oxygen is produced from the
[illegible] D. [illegible]
[Molar volume of a gas s.t.p = 22.4 dm^3]
C. evaporation D. absorption

2. Which of the following is a physical change?
A. Burning kerosene
B. Freezing ice-cream
C. Exposing white phosphorus to air
D. Dissolving calcium in water

3. What is the percentage by mass of oxygen in $Al_2(SO_4)_3.2H_2O$?
A. 14.29% B. 25.39%
C. 50.79% D. 59.25%
[A = 27, S=32, H=1, O=16]

4 The filter in a cigarette reduces the nicotine content by
A. burning B. adsorption

5. $3Cu + pHNO_3 \rightarrow 3Cu(NO_3)_2 + 4H_2O + xNO$
In the equation above, the values of p and x respectively are
A. 1 and 3 B. 2 and 3
C. 6 and 2 D. 8 and 2

6. Neutral atoms of neon with atomic number 10 have the same number of electrons as
A. O^{2+} B. Ca^{2+}
C. K^+. D. Mg+

7. The noble gases owe their inactivity to
   A. octet configuration
   B. cyclic shape
   C. hexagonal shape
   D. obtuse configuration

8. According to the kinetic theory, an increase in temperature causes the kinetic energy of particles to
   A. decrease B. increase
   C. remain constant D. be zero

9. I. $H = Is^1$
   II $N = Is^2 2s^2 2p^3$
   III $O = Is^2 2s^2 2p^4$
   IV $Zn = Is^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10}$

   From the above, which of the following pairs is likely to be paramagnetic?
   A. I and II B. I and III
   C. I and IV D. I and IV

10. A gas exerts pressure on its container because
   A. some of its molecules are moving faster than others
   B. of the collision of the molecules with each other
   C. of the mass of the molecules of gas
   D. the molecules of a gas collide with walls of the container.

11. When cathode rays are deflected onto the electrode of an electrometer, the instrument becomes
   A. negatively charged B. positively charged
   C. neutral D. bipolar

12. The weakest attractive forces that can be observed between two molecules is
   A. ionic B. covalent
   C. coordinate covalent
   D. Van der Waals.

13. A consequence of global warming is
   A. air pollution
   B. water pollution
   C. increased humidity
   D. flooding

14. Which of the following ions is acidic?
   A. K^+ B. NO_3^-
   C. S^{2-} D. H_3O^+

15. The structural component that makes detergent dissolve more quickly in water than soap is
   A. $-SO^{3-}Na^+$ B. $-COO^-Na^+$
   C. $-SO_4^-Na^+$ D. $-COO^-K^+$

16. A liquid that will dissolve fat is
   A. hydrochloric acid
   B. calcium hydroxide
   C. kerosene
   D. water

17. What a mass K_2CrO_4 is required to prepare 250 cm^3 of
   A. 0.97 g B. 9.70 g
   C. 19.42 g D. 97.10 g
   [$K_2CrO_4 = 194.2$ g mol dm^{-1}]

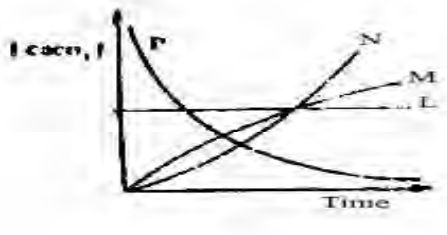
18. Farmlands affected by crude-oil spillage can be decontaminated by
   A. adding acidic solution
   B. using aerobic bacteria
   C. pouring water on the affected area
   D. burning off the oil from the area.

19. When 10g of sodium hydroxide is dissolved in 100cm^3 of water, the solution formed is approximately
   A. 0.01 mol dm^{-3} B. 0.10 mol dm^{-1}
   C. 0.25 mol dm^{-1} D. 0.50 mol dm^{-1}
   [Na = 23, H= 1, O = 16]

20. A change in the temperature of a saturated solution disturbs the equilibrium between the
   A. dissolved solute and the solvent
   B. Solvent and the undissolved
   C. Dissolved solute and the undissolved solute
   D. Dissolved solute and the solution.

21. If an equilibrium reaction has $\Delta H > 0$, the reaction will proceed favourable in the forward direction.
   A. high temperature
   B. any temperature
   C. low temperature
   D. minimum temperature

22. Δ



n the
oxide

23. s that
   A. electrons are consumed
   B. oxidation is involved
   C. ions are reduced
   D. electrode dissolves

24. Which of the following will change when a catalyst is added to a chemical reaction?
   A. The activation energy
   B. The potential energy of the reactants
   C. The heat of reaction
   D. The potential energy of the products.

25. If Y is an oxidizing agent that reacts with a reducing agent, Z, which of the following is correct?
A. Y increases in oxidation number
B. Y becomes reduced
C. Z loses protons
D. Z gains protons.

26. When at equilibrium, which of the reactions below will shift to the right if the pressure is increased and the temperature is kept constant .
A. $2SO_{3(g)}$ $2SO_{2(g)} + O_{2(g)}$
B. $2SO_{2(g)}$ $2CO_{(g)} + O_{2(g)}$
C. $2H_{2(g)}$ +'!$O_{2(g)}$ $2H_2O_{(g)}$
D. $2NO_{(g)}$ $N_{2(g)} + O_{2(g)}$

27. In the electrolysis of a concentrated solution of sodium chloride using inert electrodes, which of the following ions are discharge at the cathode and anode respectively? ⟶
A. Na^+ and Cl^- ⟶ B. Na^+ and OH^-
C. H^+ and OH^- D. H^+ and Cl^-

28. $CO_{(g)} + H_2O_{(g)}$ $CO_{2(g)} + H_{2(g)}$
From the reaction above, calculate the standard heat change if the standard enthalpies of formation of $CO_{2(g)}$ $H2O_{(g)}$ and $CO_{(g)}$ in kJ mol^{-1} are –394, -242 and –110 respectively.
A. -262 $kJmol^{-1}$ B. –42 $kJmol^{-1}$
C. +42 $kJmol^{-1}$ D. +262 $kJmol^{-1}$
⟶

29. When sugar is dissolved in a tea, the reaction is always accompanied by
A. positive entropy change
B. negative entropy change
C. no entropy change
D. a minimum entropy change.

30. Which of the following is an electrolyte?
A. Alcohol
B. Sodium acetate solution
C. Solid potassium hydroxide
D. Mercury

31. Chlorine gas is prepared in the laboratory by
A. adding concentrated hydrochloric acid to solid manganese (1V) oxide
B. adding concentrated tetraoxosulphate (V1) acid to solid sodium chloride
C. dropping concentrated hydrochloric acid onto potassium tetraoxomanganate (V11) crystals
D. oxidizing concentrated hydrochloric using potassium heptadichromate (V1) crystals.

32. Metal of the transition series have special properties which are different from those of groups 1 and 11

elements because they have partially filled
A. s orbitals B. p orbitals
C. d orbitals D. f orbitals

33. Hydrogen can be displace form a hot alkaline solution by.
A. Fe B. Cu
C. Ca D. Sn

34. Which of the following statements is true of sulphur (1V) oxide?
A. It forms tetraoxosulphate(V1) acid with water
B. It is an odourless gas
C. It is an acid anhydride
D. It forms white precipitate with acidified barium chloride.

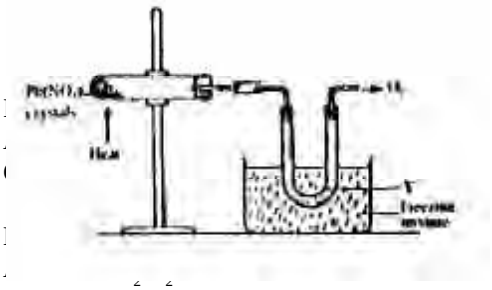
35. The salt that will form a precipitate soluble in excess ammonia solution is
A. $Ca(NO_3)_2$ B. $Cu(NO_3)_2$
C. $Mg(NO_3)_2$ D. $Al(NO_3)_2$

36. The metal liberates hydrogen from cold water in bubbles only is
A. Na B. K
C. Ca D. Al

37. Chlorine gas turns a damp starch-iodine paper
A. pink B. colourless
C. red D. dark blue

38. The modern process of manufacturing steel form iron is by
A. treatment with acids
B. oxidation
C. blast reduction
D. treatment with alkalis

39.



40.
B. $CH_3\dot{C}H_2Br$
C. $C_2H_2Br_2$
D. $CHBr_3$

41. Carbohydrates are compounds containing carbon hydrogen and oxygen in the ration
A. 3 : 1 : 1 B. 2 : 1 : 1
C. 1 : 2 : 1 D. 1 : 1 : 1

42 How many isomers does pentane have?
A. 6 B. 5
C. 4 D. 3

43. The leachate of a certain plant ash is used in local soap making because if contains

B. sodium hydroxide
C. potassium hydroxide
D. soluble carbonates and hydrogen carbonates.

44. The formula for ethyl butanoate is
A. $C_3H_7COOC_2H_5$ B. $C_2H_5COOC_3H_7$
C. $C_4H_9COOC_2H_5$ D. $C_2H_5COOC_4H_9$

45. The type of reaction that is peculiar to benzene is
A. addition B. hydrolysis
C. polymerization D. substitution

46. Ethanol reacts with excess acidified $K_2Cr_2O_7$
A. ethanedioc acid B. ethanol
C. ethyl ethanoate D. ethanoic acid

47. A compound contains 40.0% caron 6.7% hydrogen and 53.3% oxygen. If the molar mass of the compound is 180, find the molecular formula.
A. CH_2O B. $C_3H_6O_3$
C. $C_6H_{12}O_6$ D. $C_6H_6O_3$
[H = 1, C= 12, O = 16]

48. The process by which atoms are rearrange into different molecular structures in the petroleum refining process is referred to as
A. catalytic cracking B. hydrocracking
C. plolymerization D. reforming

49. Which of the following is found in cotton
A. Starch B. Cellulose
C. Fat D. Oil

50. The principal constituent of natural gas is
A. methane B. ethane
C. propane D. butane.

Chemistry 2004

1. In the electrolysis of brine, the anode is
A. Zinc
B. Platinum
C. Carbon
D. Copper.

2. $N_2O_{4(g)} \longleftrightarrow 2NO_{2(g)}$
In the endothermic reaction above, more product formation will be favoured by
A. a decrease in pressure
B. a decrease in volume
C. an increase in pressure
D. a constant volume

3. The oxidation state of Chlorine in $HClO_4$ is
A. -1 B. –5
C. +7 D. +1

4. Which of the following hydrogen halides has the highest entropy value?
A. HBr B. HF
C. Hl D. HCl

5. The mass of silver deposited when a current of 10A is passed through a solution of silver salt for 4830s
A. 54.0 g B. 27.0 g
C. 13.5 g D. 108.0 g
[Ag = 108, F = 96500 C mol^{-1}]

6. Which of the following acts as both a reducing and an oxidizing agent?
A. H_2S B. CO_2
C. H_2 D. SO_2

7. Which of the following shows little or not net reaction when the volume of the system is decreased?
A. $2O_{3(g)} \longleftrightarrow 3O_{2(g)}$
B. $H_{2(g)} + I_{2(g)} \longleftrightarrow 2HI_{(g)}$
C. $2NO_{2(g)} \longleftrightarrow N2O_{4(g)}$
D. $PCl_{5(g)} \longleftrightarrow PCl_{3(g)} + Cl_{2(g)}$

$2CO + O_2 \rightarrow 2CO_2$

8. Given that $\triangle H[CO]$ is – 110.4 $kJmol^{-1}$ and $\triangle H[CO_2]$is $–393^o$ $kJmol^{-1}$, the energy change for the reaction above is
A. -282.6 kJ B. +503.7 kJ
C. –503.7 kJ D. +282.6 kJ

$ZnO + CO \rightarrow Zn + CO_2$

9. In the reaction above, Zinc has been
A. displaced B. oxidized
C. reduced D. decomposed.

10. What volume of gas is evolved at s.t.p. if 2g of Calcium trioxocarbonate(iv) is added to a solution of hydrochloric acid?
A. 224 cm^3 B. 112 cm^3
C. 2240 cm^3 D. 448 cm^3
[Ca = 40, C=12, O=16, Cl =35.5, H= 1, Molar volume of a gas at s.t.p =22.4 dm^3]

11. A chemical reaction is always associated with
A. a change in the nature of the reactants
B. the formation of new substances
C. a change in the volume of the reactants
D. an increase in the composition of one of the substances,

12. When a solid substance disappears completely as a gas on heating, the substance is said to have undergone.
A. sublimation B. crystallization
C. distillation D. evaporation

13. If a solution contains 4.9g of tetraoxosulphate (V1) acid, calculate the amount of copper (11) oxide that will react with it
A. 40.0 g B. 80.0 g
C. 0.8 g D. 4.0 g
[Cu = 64, O =16, S =32, H =1]

14. Vulcanization involves the removal of
A. the single bond B. a double bond
C. a polymer D. a monomer

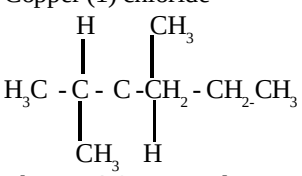
15. The alkyl group can be represented by the general formula.
A. C_nH_{2n} B. C_nH_{2n-2}
C. C_nH_{2n+1} D. C_nH_{2n+2}

16. $C_2H_5OH_{(aq)} \xrightarrow[180^oC]{Conc.\ H_2SO_4} Y$
In the reaction above, Y represent
A. C_2H_5COOH B. CH_4
C. CH_3OCH_3 D. C_2H_4

17. In the production of soap, concentrated sodium chloride is added to
A. saponify the soap
B. emulsify the soap
C. decrease the solubility of the soap
D. increase the solubility of the soap

18. Oxyacetylene flame is used for 1ron-welding because it
A. evolves a tot heat when burnt
B. dissociates to produce carbon (1V) oxide and oxygen
C. makes the iron metal solidify very quickly
combines with oxygen give a pop sound.

19. Which of these reagents can confirm the presence of a triple bond?
A. Bromine gas
B. Bromine water
C. Acidified $KMnO_4$
Copper (1) chloride

20.

The IUPAC nomenclature of the compound above is
A. 3,4 -dimethylhexane
B. 2,3 –dimethylhexane
C. 2 – ethylhexane
D. 2 – ethylpentane

21. An isomer of C_5H_{12} is
A. 2 –ethyl butane
B. butane
C. 2- methyl butane
2- methyl propane

22. Alkanol + Alkanoic acid $\longrightarrow$ Ester + Water

The reverse reaction of the equation above is known as.
A. saponification B. hydrolysis
C. fermentation D. hydration

23. $CH_3COOH_{(g)} \longrightarrow CH_{4(g)} + CO_{2(g)}$
The reaction above is
A. acidification B. esterification
C. decarboxylation D.carboxylation.

24. A characteristic of the alkane family is
A. substitution reaction
B. neutralization reaction
C. addition reaction
D. elimination reaction.

25. Pollution of underground water by metal ions is very likely in a soil that has high
A. alkalinity B. nitrate content
C. acidity D. chloride content

26. The solubility in mol dm^{-3} of 20g of $CuSO_4$ dissolved in 100g of water at 180°C is
A. 0.25 B. 0.13
C. 2.00 D. 1.25
[Cu = 64, S =32, O = 16]

27. Which of these compounds is a normal salt?
A. Na_2CO_3 B. $NaHCO_3$
C. $NaHSO_4$ D. NaHS

28. A carcinogenic substance is
A. nitrogen (ll) oxide B. carbon (ll) oxide
C. asbestos dust D. sawdust.

29. What volume of 0.5mol dm^{-3} H_2SO_4 will exactly neutralize 20 cm^{-3} of 0.1mol dm^{-3} NaOH solution?
A. 5.0 cm^{-3}
B. 6.8 cm^{-3}
C. 8.3 cm^{-3}
D. 2.0 cm^{-3}

30. Calcium tetraoxosulphate (V1) dissolves in water only sparingly to form a
A. colloid B. solution
C. suspension D. precipitate

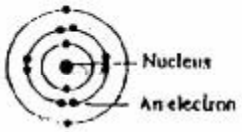
31 Hardness of water is caused by the presence of the ions of
A. calcium and magnesium
B. calcium and sodium
C. magnesium and silver
D. sodium and potassium

32. It is difficult to achieve an orderly arrangement of the molecules of a gas because they.
A. can collide with one another in the container
B. are too small in size
C. have little force of attraction between them
D. have no definite shape

33. The shape of the s-orbital is
A. elliptical B. spiral
C. circular D. spherical

34. Which of the following mixtures of gases is likely to burn in flame?
A. Helium and neon
B. Neon and nitrogen
C. Neon and hydrogen
D. Nitrogen and helium

35. The property of chlorine which cause hydrogen chloride to be more ionic than the chlorine molecule is its.
A. electronegativity B. electropositivity
C. electron affinity D. electrovalency.

36. 

In the experiment above, **X** is mixture of nitrogen, carbon 1V) oxide and
A. oxygen B. inert gas
C. water D. impurities

37. A given volume of methane diffuses in 20s. How long will it take same volume of sulphur (V1) oxide to diffuse under the same conditions?
A. 40s B. 60s
C. 20s D. 5s
[C=12, H=1, S=32, O=16]

38. Chlorine consisting of two isotopes of mass numbers 35 and 37 in the ratio 3:1 has an atomic mass of 35.5. Calculate the relative abundance of the isotope of mass number 37.
A. 60 B. 20
C. 75 D. 25

39. An electron can be added to a halogen atom to form a halide ion with
A. 8 valence electrons
B. 7 valence electron
C. 2 valence electrons
D. 3 valence electrons

40. $^{226}_{88}Ra \longrightarrow {}^{x}_{86}Rn +$ alpha - particle
A. 226
B. 220
C. 227
D. 222

41. According to Charles' law, the volume of a gas becomes zero at
A. -100°C B. -273°C
C. -373°C D. 0°C

42. When steam is passed over red-hot carbon, the substances produced are
A. hydrogen and carbon(11) oxide
B. hydrogen and carbon(1V) oxide
C. hydrogen and trioxocarbonate (1V) acid
D. hydrogen, oxygen and carbon (1V) oxide

43. Aluminum hydroxide is used in the dyeing industry as a
A. dye B. dispersant
C. salt D. mordant

44. Transition metals possess variable oxidation states because they have.
A. electrons in the s orbitals
B. electrons in the d orbitals
C. partially filled p orbitals
D. a variable number of electrons in the p orbitals.

45. The allotrope of carbon used in the decolourization of sugar is
A. soot B. lampblack
C. graphite D. charcoal

46. Carbon is tetravalent because
A. the 2s and 2p atomic orbital hybridized
B. all the atomic orbitals of carbon hybridize
C. the electrons in all the orbital of carbon are equivalent
D. the electrons in both the 2s and 2p orbital are equivalent.

47. Sodium metal is always kept under oil because it
A. is reduced by atmospheric nitrogen
B. readily reacts with water
C. reacts with oxygen and carbon(1V)oxide
D. reacts vigorous on exposure to air.

48. Alloys are best prepared by
A. cooling a molten mixture of the metals
B. reducing a mixture of their metallic oxides
C. arc-welding
D. electroplating

49. Sulphur (1V) oxide bleaches by
A. hydration B. reduction
C. absorption D. oxidation.

50. Which of the following gases can be collected by the method of downward delivery?
A. Oxygen B. Hydrogen
C. Chlorine D. Ammonia