Chemistry
Paper 1

Instructions: This paper consist of 60 multiple choice questions. Circle the correct answer for each question.

Items 1-2 refer to the following atoms represented by their electronic configuration.
(A) 2, 4
(B) 2, 8
(C) 2, 8, 6
(D) 2, 8, 8, 2

Match each item below with one of the options above. Each option may be used more than once, once or not at all.

Which element

1. Combines with chlorine to form ionic bonds?

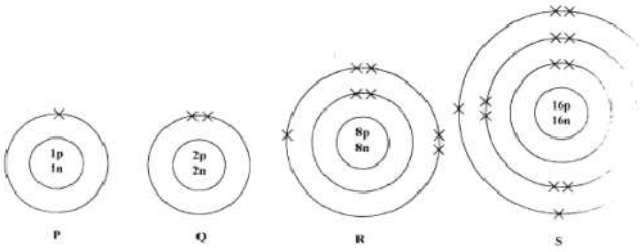
2. Forms many giant structures occurring both naturally and artificially?

3. In which of the following are radioactive isotopes NOT used
   a. Radiotherapy
   b. Carbon dating
   c. Metal extraction
   d. Energy generation

4. Which of these elements has seven electrons in its outer shell?
   a. Hydrogen
   b. Oxygen
   c. Nitrogen
   d. Chlorine

5. The ionic equation for the reaction between an acid and a carbonate may be represented as
   a. $H^{+}_{(aq)} + CO_3^{2-}{}_{(aq)} \longrightarrow HCO^{3-}{}_{(aq)}$
   b. $2H_{+(aq)} + CO_3^{2-}{}_{(aq)} \longrightarrow H_2CO_{3(aq)}$
   c. $2H^{+}_{(aq)} + CO_3^{2-}{}_{(aq)} \longrightarrow CO_{2(g)} + H_2O_{(l)}$
   d. $H^{+}_{(aq)} + CO_3^{2-}{}_{(aq)} \longrightarrow CO_{2(g)}\ H_2O_{(l)}$

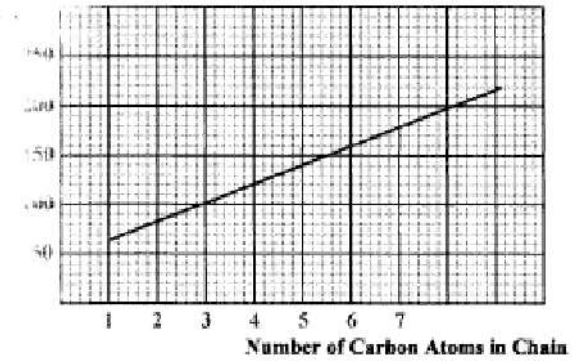
Item 6 refers to the following illustrations of the electronic structure of four atoms



6. Which pair of atoms forms covalent bonds when reacted together?
   a. P and Q
   b. P and S
   c. Q and S
   d. Q and R
7. Which of the following is the type of crystal structure of iodine at room temperature and pressure?
   a. Ionic
   b. Metallic
   c. Giant Molecular
   d. Simple molecular

8. A metallic bond is formed when
   a. Cations are held together by a sea of mobile electrons
   b. Positive metal ions are held together by a sea of anions
   c. Anions are held together by negative electrons
   d. Metal atoms are held together by molecular forces

Item 9 refers to the following graph which shows the boiling points of some straight chain alcohols.



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9. The MOST suitable method for separating the 4-carbon alcohol from a mixture with the 5-carbon alcohol is
   a. Fractional distillation
   b. Solvent extraction
   c. Simple distillation
   d. Simple evaporation

10. Which of the following is the correct formula for ammonium carbonate
    a. NH_4CO_3
    b. $NH_4(CO_3)_2$
    c. $(NH_4)_2CO_3$
    d. $(NH_4)_2(CO_3)_2$

11. Which of the following separation techniques is NOT used during the extraction of sucrose from sugar cane?
    a. Filtration
    b. Precipitation
    c. Centrifugation
    d. Chromatography

12. Which of the following does NOT affect the solubility of a substance?
    a. Catalyst
    b. Pressure
    c. Stirring
    d. Temperature

13. A piece of calcium is added to some distilled water in a container and a gas is produced. The gas produced is expected to
    a. Relight glowing splint
    b. Give a 'pop' with a lighted splint
    c. Decolourize acidified aqueous potassium managante (VII)
    d. Turn acidified aqueous potassium dichromate green

14. Which set of elements has atoms with two electrons in their outer shells?
    a. The halogens
    b. Period 2 elements
    c. Group II elements
    d. The transition elements

Items 15 – 16 refer to the following types of substances.
(A) Salt
(B) Base
(c) Alkali
(D) Acid

Match each item below with one of the following options above. Each option may be used more than once, once or not at all

15. The oxide of a metal

16. Supplies protons as the only positive ions in aqueous solutions

17. When X and Y are stirred together in a beaker and the mixture filtered, X and Y are both present in the filtrate. Which of the following could describe the mixture formed by X and Y?

    I. Solution
    II. Colloids
    III. Suspension

    a. I only
    b. III only
    c. I and II only
    d. II and III only

18. Which of the following compounds are acid salts?

I. NaH_2PO_4
II. $CaSO_4$
III. Al_2CO_3
IV. $KHSO_4$

a. I and II only
b. I and IV only
c. II and III only
d. III and IV only

Items 19 – 20 refer to the following chemicals.

(A) Calcium carbonate
(B) Magnesium metal
(C) Barium Chloride
(D) Litmus solution

In answering items 19 – 20, a particular choice from the above may be made more than once, once or not at all.

Which of these chemicals

19. Reacts with an acid, liberating a gas which turns lime water milky?

20. Reacts with sulphuric acid to produce hydrogen gas?

21. Elements are arranged in the Periodic Table on the Basis of their
    a. Atomic mass
    b. Mass number
    c. Atomic number
    d. Neutron number

22. Which of the following is NOT a use of the Periodic Table?
    a. Summarizing the properties of the elements
    b. Fixing relative atomic masses
    c. Predicting the existence and properties of undiscovered elements
    d. Determining the densities and melting points of elements

23. The alkali metals are found in the Periodic Table in Group
    a. I
    b. II
    c. III
    d. IV

24. Silicon and carbon are in the same group in the Periodic Table. The formula of Silicon chloride is
    a. $SiCl_2$
    b. $SiCl_4$
    c. SiCl
    d. Si_2Cl

25. Which of the following pairs of elements are in the same Period in the Periodic Table?
    a. Sodium and Potassium
    b. Aluminum and silicon
    c. Fluorine and chlorine
    d. Phosphorous and oxygen

26. In which of the following groups of the periodic Table would you expect to find an element X with the greatest basic character?
    a. II
    b. IV
    c. V
    d. VII

27. In the arrangement of elements in the Periodic Table
    a. The metallic character of the elements increases from left to right of a period
    b. The non-metallic character of the elements decreases from right to left of a period
    c. The most reactive elements are found in the centre of a period
    d. The elements are arranged in order of decreasing densities

28. Beryllium has two electrons in its outermost electron shell and a total of two shells. The number of electrons present in an atom of this element is
    a. 2
    b. 4
    c. 10
    d. 8

29. Which of the following statements is FALSE? In a given group, as the number of electron shells increases,
    a. The atoms increase in size
    b. The electrons in the outermost electron shell are less strongly attached to the nucleus
    c. The reactivities of the elements decrease.
    d. The reactivities of the elements decrease or increase depending on the actual group.

30. The maximum of electrons which a particular electron shell can accommodate is given by the formula $2n^2$, where n is an integer representing the number of the shell. What is the maximum number of electrons in the outer shell of elements in Period 3 of the Periodic Table?
    a. 18
    b. 8
    c. 2
    d. 36

31. Elements in Group 0 of the Periodic Table
    a. Possess no electrons in the outermost electron shell
    b. Are identical in structure
    c. Are chemically inert
    d. Are unreactive solids

32. The halogens are placed in Group VII of the Periodic Table because they
    a. Have seven valency electrons
    b. Ionize by gaining electrons
    c. Possess identical properties
    d. Are all oxidizing agents

33. Which one of the following statements about transition elements is FALSE?
    a. The majority of these elements form more than one ion
    b. The majority of these elements form coloured compounds
    c. The majority of these elements are dense
    d. All of these elements are unreactive

34. Of the elements sodium, potassium, chlorine and iodine, the most metallic is
    a. Sodium
    b. Potassium
    c. Chloride
    d. Iodine

35. In which of the following compounds is dative bonding present?
    a. Methane
    b. Carbon monoxide
    c. Ethanol
    d. Sulphur dioxide

36. Which of the following statement is FALSE?
    a. Hydrogen chloride is covalent
    b. Water is ionic
    c. Aqueous hydrogen chloride is ionic
    d. Ammonia gas is covalent

37. Which of the following statements is FALSE? Metals are good electrical and thermal conductors because
    a. The atoms are very tightly packed
    b. The outer shell electrons of the atoms wander away from the nuclei and form an electron cloud.
    c. The electron cloud can constitute an electric flow or current.
    d. The cations formed when the electrons are lost vibrate

38. Solid sodium chloride, although composed of ions, is a poor electrical conductor because
    a. The ions have neutralized each other's charge.
    b. The ions are bonded and hence are unable to move
    c. The ions are moving too rapidly
    d. The solid vapourises when electrical energy is supplied.

39. What type of lattice exists in liquid ICE?
    a. Ionic
    b. Atomic
    c. Metallic
    d. Simple molecular

40. From the information given below in the table below, which of the substances A, B, C or D, is MOST likely sodium chloride?

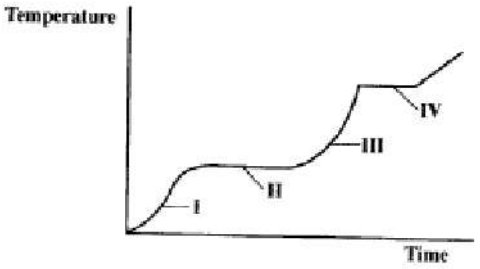
Substance	Boiling point °C	Electrical conductivity	
		in the solid state	in aqueous state
A	1 465	no	yes
B	444	no	no
C	2 600	yes	no
D	-35	no	yes

41. The SMALLEST particle of a chemical compound that can take part in a reaction is te
    a. Atom
    b. Mole
    c. Formula
    d. Molecule

42. A solution has a pH of 1. This solution would expected to
    a. React with zinc metal to produce hydrogen
    b. React with zinc metal to produce a solution of pH 10
    c. Neutralize a solution of pH 4
    d. React with hydrochloric acid to produce a salt and water

43. Which of the following statements about ionic compounds is true?
    a. They contain molecules
    b. They are solids and vaporize easily
    c. They usually dissolve in organic solvents
    d. They conducts electricity when melted or dissolved in water

Item 44 refers to the following graph which shows changes in temperature with time, for a substance heated until no further physical changes take place



44. During which portion of the curve is the substance a liquid only?
    e. I
    a. II
    b. III
    c. IV

45. Ions which are NOT changed in a reaction are called
    a. Metallic ions
    b. Nonmetallic ions
    c. Spectator ions
    d. Radicals

46. Which of the following will NOT conduct electricity?
    a. Solid calcium
    b. Solid calcium chloride
    c. Molten calcium chloride
    d. A solution of calcium chloride in water

47. Which of the following salts are soluble in water?

    I. Lead chloride
    II. Ammonium carbonate
    III. Calcium sulphate
    IV. Lead nitrate

    a. IV only
    b. I and III only
    c. II and IV only
    d. I, II and III only

48. The ionic equation between zinc and sulphuric acid can BEST be represented by

a. $Zn_{(s)} + 2H^+_{(aq)} \longrightarrow Zn^{2+}_{(aq)} + H_{2(g)}$

b. $Zn_{(s)} + H_2SO_{4(aq)} \longrightarrow ZnSO_{4(aq)} + H_{2(g)}$

c. $Zn_{(s)} + H_2SO_{4(aq)} \longrightarrow Zn_{2+(aq)} + SO_4^{2-}{}_{(aq)} + H_{2(aq)}$

d. $Zn_{(s)} + 2\,H^+_{(aq)} + SO_4^{2-}{}_{(aq)} \longrightarrow Zn^{2+}{}_{(aq)} + SO_4^{2-}{}_{(aq)} + H_{2(g)}$

49. A mixture of copper (II) oxide and copper (II) sulphate could BEST be separated by
    a. Shaking with excess water and then filtering
    b. Heating the mixture and condensing
    c. Shaking with excess water followed by fractional distillation
    d. Distilling the mixture

50. Which of the following halogens is a liquid at room temperature?
    a. Bromine
    b. Fluorine
    c. Chlorine
    d. Iodine

51. Which one of the following does NOT mix with water?
    a. Alcohol
    b. Oil
    c. Sulphuric acid
    d. Milk

52. The name given to the solid left on the filter paper after filtration is the
    a. Filtrate
    b. Solute
    c. Residue
    d. Solvent

53. The components of crude oil can BEST be separated by
    a. Fractional distillation
    b. Cracking
    c. Centrifugation
    d. Gas chromatography

54. Which of the following process can be used to separate sand and water?
    a. Distillation
    b. Filtration
    c. Evapouration
    d. Sublimation

55. What technique can be used to separate a solution of iodine and sodium chloride?
    a. Filtration
    b. Solvent extraction
    c. Decanting
    d. Centrifugation

56. The most suitable process to use in order to separate the pigments in the chlorophyll of a plant is
    a. Solvent extraction
    b. Fractional distillation
    c. Chromatography
    d. Centrifugation

57. The best method to use to separate a mixture of solid ammonium chloride and solid sodium chloride is
    a. Distillation
    b. Sublimation
    c. Evapouration
    d. Filtration

58. Two liquids which are insoluble in each other are said to be immiscible. When they are shaken together, the resulting mixture is
    a. A colloid
    b. A suspension
    c. An emulsion
    d. A gel

59. Two immiscible liquids may be separated from each other by the use of
    a. A filter funnel
    b. Distillation apparatus
    c. A centrifuge
    d. A separating funnel

60. 'Super-saturated' solutions are in an unstable condition. Which of the following conditions is NOT conducive to the formation of such a solution?
    a. Slow cooling of the solution
    b. Shaking or disturbing the solution
    c. Dust-free conditions
    d. Absence of crystals of the solute