

CHEMISTRY - PASS

FRIDAY, 19th JUNE - Afternoon, 2.00 to 4.30

SIX questions to be answered

Atomic weight: C = 12, O = 16, Na = 23,
Periodic Table may be obtained from the Superintendent.

1. Describe and discuss, in the light of the kinetic theory, the effect on a gas of (i) heating, (ii) cooling.
Describe with the aid of a sketch how you would measure (i) the melting point of a given solid, (ii) the boiling point of a given liquid. (66 marks)

2. State clearly what you understand by (i) a covalent bond, (ii) an electrovalent bond. Discuss the bonds in chlorine, hydrogen chloride and sulphur dioxide, and outline the preparation and properties of one of these substances. (66 marks)

3. Use diagrams to illustrate the structure of an atom of each of the following: hydrogen, helium, carbon, oxygen, neon, sulphur. Refer to the valence of each of these elements.
State briefly what you understand by isotopes. (66 marks)

4. State what you understand by (i) diffusion of gases, (ii) osmosis. Describe an experiment to illustrate each of these phenomena.
A given mass of gas has a volume of 380 c.c. at 100°C and at a pressure of 746 mm of mercury. Find its volume at S.T.P. (66 marks)

5. Show, with the aid of a labelled diagram, how you would find the chemical equivalent of magnesium (i) by oxidation of the element, (ii) by displacement of hydrogen.
Knowing the chemical equivalent of magnesium state how you would find its atomic weight. (66 marks)

6. Use equations to represent (i) the addition of bromine to ethylene, (ii) an addition reaction of an aldehyde, (iii) the reduction of acetaldehyde, (iv) the dehydration of an alcohol. Name the products formed in each case.
Select any one of the above reactions and describe how you would carry it out in the laboratory. (66 marks)

7. Compare three oxides of nitrogen with one another under the following headings:
(i) preparation, (ii) properties, (iii) structure. (67 marks)

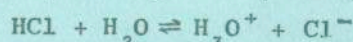
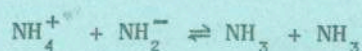
8. The following elements occur in this order in the activity ('electrochemical') series:
K Na Mg Al Zn Fe Pb H Cu Ag Au I Br Cl F
Electropositive ← ————— → Electronegative

Illustrate and discuss each of the following:-

- (i) metals displace less electropositive metals from solutions of their salts,
- (ii) hydrogen is displaced from water by the more electropositive metals,
- (iii) halogens displace less electronegative halogens from solutions of their salts,
- (iv) the most electropositive elements are the strongest reducing agents,
- (v) only the least electropositive metals are found as free elements in nature. (67 marks)

9. (i) Use a labelled diagram to illustrate the preparation of carbon dioxide.
Give an account of the principal properties of carbon dioxide.
(ii) If 20 c.c. of sodium carbonate solution required 22 c.c. of normal hydrochloric acid to neutralise it, find the concentration of the sodium carbonate solution in terms of (i) normality, (ii) grams of anhydrous sodium carbonate per litre.
Describe how you would carry out this titration and mention the indicator you would use. (67 marks)

10. (a) State what you understand by (i) a Brønsted acid, (ii) a Brønsted base, (iii) a conjugate acid, (iv) a conjugate base. Consider the following equations and indicate which items are "acid", "base", "conjugate acid", "conjugate base":



(b) Select any one group in the periodic table and show the relation between electronic configuration and membership of the group. Comment on similarities and differences within the group you select. (67 marks)