

AN ROINN OIDEACHAIS

LEAVING CERTIFICATE EXAMINATION, 1966

CHEMISTRY - PASS

FRIDAY, 17th JUNE - Afternoon, 2.30 - 5

Not more than six questions may be attempted.

Gram-molecular volume = 22.4 litres.

Atomic weights: H = 1, C = 12, O = 16, Na = 23,  
S = 32, Cl = 35.5, Ba = 137.

1. Select any three groups in the periodic table and show the relation between the outer electronic structure of the elements and membership of the group. Comment on physical and chemical similarities within each of the groups you select. (You are not required to go outside the first twenty elements of the periodic table in answering this question, but, if you wish, you may do so.)

(66 marks)

2. Describe the kinetic theory of gases and the assumptions on which it is based.

Show how Boyle's Law or Graham's Law of diffusion may be explained on the basis of the kinetic theory.

(66 marks)

OR

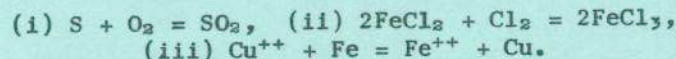
2. Describe, with the aid of a diagram, how you would prepare and collect (i) gaseous hydrogen chloride, (ii) an aqueous solution of hydrogen chloride. Give an account of the properties of (i) and (ii).

Comment on the bond in hydrogen chloride.

(66 marks)

3. Explain what you understand by oxidation/reduction reactions.

In the case of each of the following reactions, name the substance oxidised, the substance reduced and the reducing agent:



Excluding substances already mentioned in this question, name two reducing agents. Illustrate, by means of equations, the use of each of the agents you name. (66 marks)

4. (a) Describe how you would prepare a normal solution of sodium carbonate.

25 c.c. of 1.1 N sodium carbonate were neutralised by 20 c.c. of a given solution of hydrochloric acid. Express the concentration of the hydrochloric acid solution in terms of (i) normality, (ii) grams of hydrogen chloride per litre.

(b) A given solution contains 8.32 gm. of barium chloride per litre. What weight of barium sulphate would be precipitated if 50 c.c. of the solution were treated with excess sulphuric acid? (66 marks)

5. Describe how you would prepare and collect dry ammonia and give an account of its properties.

Write the name and formula for each of any three ammonium salts and describe how you would prepare one of them. (66 marks)

6. Write the structural formula for each of the following compounds:- (i) methane, (ii) acetaldehyde, (iii) nitrobenzene. Give an account of the principal properties of each of these compounds and describe how one of them may be prepared. (66 marks)

OR

6. Compare and contrast metals and non-metals with regard to (i) general physical properties, (ii) general chemical properties.

Describe and explain what happens when a piece of zinc plate is immersed in a solution of copper sulphate.

(66 marks)

7. A compound of vapour density 14 has the following gravimetric composition: carbon 85.72%, hydrogen 14.28%. Name the compound, describe its principal properties, write its structural formula and discuss its structure. (67 marks)

OR

7. Describe how you would prepare and collect sulphur dioxide and give an account of its properties.

Calculate (i) the mass of sulphur dioxide, (ii) the volume of sulphur dioxide at S.T.P., which could be got from the combustion of 1 gm. of sulphur. (67 marks)

8. What is osmotic pressure? Describe, with the aid of a sketch of the apparatus, how the osmotic pressure of a solution may be measured.

Two solutions have the same osmotic pressure. One contains 1.08 gm. of glucose ( $C_6H_{12}O_6$ ) per litre; the other contains 0.36 gm. per litre of a given compound. Find the molecular weight of the given compound.

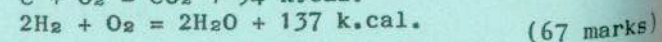
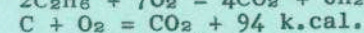
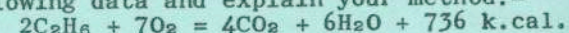
What is the effect of temperature on the osmotic pressure of a solution? (67 marks)

OR

8. Use chemical equations to illustrate (a) the action of heat on (i) potassium chlorate, (ii) a mixture of ammonium chloride and sodium nitrite, (iii) crystalline ferrous sulphate; (b) the action of water on (i) sodium, (ii) quicklime. In each case describe what may be observed during the reaction and name the products formed. (67 marks)

9. State what you understand by (i) a calorie, (ii) an endothermic reaction, (iii) heat of reaction.

Find the heat of formation of ethane from the following data and explain your method:-



10. Describe the principal properties of each of any four of the following substances:- (i) white phosphorus, (ii) red phosphorus, (iii) phosphine, (iv) phosphorus pentoxide, (v) orthophosphoric acid, (vi) metaphosphoric acid, (vii) pyrophosphoric acid, (viii) phosphorous acid.

Describe how you would prepare any two compounds of phosphorus.

(67 marks)