

AN ROINN OIDEACHAIS

(Department of Education)

LEAVING CERTIFICATE EXAMINATION, 1959.

CHEMISTRY.—HONOURS.

FRIDAY, 12th JUNE.—MORNING, 10 TO 12.30.

Not more than six questions may be attempted.

Atomic weights: C=12; N=14; Na=23; Mg=24; Ca=40.
Gram-molecular volume=22.4 litres.

1. Describe, with the aid of a sketch of the apparatus, how you would prepare dry hydrogen sulphide and how you would measure its volume composition.

Write chemical equations to illustrate the action of hydrogen sulphide on the following: (a) chlorine, (b) nitric acid, (c) potassium permanganate, and explain how these reactions demonstrate the processes of oxidation and reduction.

[66 marks.]

2. Describe an industrial method for the manufacture of washing soda.

Explain (a) what happens when crystals of washing soda are exposed to the atmosphere, (b) why a solution of washing soda in water is alkaline.

[66 marks.]

3. Give an account, with the aid of a sketch of the apparatus, of how you would prepare dry ammonia and pass it over heated cupric oxide.

When dry ammonia was passed over heated cupric oxide, 96 c.c. of nitrogen measured at 15°C. and at a pressure of 720 mm. of mercury were released and the oxide decreased in weight by 0.184 gm. Calculate the percentage composition, by weight, of ammonia.

[66 marks.]

4. Describe how you would prepare (a) nitric acid, (b) nitrogen peroxide, and give an account of their physical properties.

Write equations to illustrate the action of nitric acid on the following and in each case mention any conditions pertaining to the action: (a) sulphur, (b) phosphorus, (c) ferrous sulphate, (d) copper, (e) tin.

[66 marks.]

5. Sketch Victor Meyer's apparatus for measuring vapour density and describe fully how you would use it to measure the vapour density of a liquid.

The gravimetric composition of a compound having a vapour density of 14 is : carbon 85.72%, hydrogen 14.28%. Find the empiric formula and the molecular formula for the compound and suggest, giving reasons, a structural formula for it.

[66 marks.]

6. Describe two chemical reactions to distinguish (a) lead nitrate from silver nitrate, (b) potassium chloride from potassium chlorate, (c) sodium sulphate from sodium acetate, (d) stannous chloride from stannic chloride, (e) ferrous sulphate from cupric sulphate. Illustrate the reactions by means of chemical equations.

[66 marks.]

7. Given pure sodium bicarbonate, describe fully how you would prepare a normal solution of sodium carbonate and how you would use this solution to find the percentage of water of crystallisation in crystals of oxalic acid.

1.4 gm. of a mixture of calcium carbonate and magnesium carbonate were put into a flask and 50 c.c. of hydrochloric acid (0.9 N.) were added to the mixture. When the reaction ceased, the solution was made up to 250 c.c. It was found that 16.1 c.c. of a solution of sodium carbonate ($\frac{N}{10}$) were required to neutralize 25 c.c. of the diluted solution. Calculate the percentage of magnesium carbonate in the mixture.

[67 marks.]

8. Give an account of the physical and chemical properties of (a) formic acid, (b) acetic acid.

Write the structural formula for acetic acid and give the evidence on which it is based.

[67 marks.]

9. State the positions occupied by magnesium and calcium in the Periodic Table.

Give an account of points of similarity between these elements in regard to (i) physical and chemical properties, (ii) structure of their atoms.

[67 marks.]

10. Describe the characteristic chemical properties of alcohols, illustrating your answer by reference to any two named alcohols.

Write the structural formula for each of the two you have named.

[67 marks.]