

AN ROINN OIDEACHAIS

(Department of Education.)

LEAVING CERTIFICATE EXAMINATION, 1945.

CHEMISTRY.—HONOURS.

TUESDAY, 19th JUNE.—MORNING, 10 TO 12.

Not more than *six* questions to be answered. All the questions have the same value.

Chemical changes should be expressed by equations as well as in words.

(Atomic Weights. O; 16. S; 32. Cl; 35.5. Ag; 107.9. C; 12).

1. Describe, with diagram and equation, a method for the preparation of ammonia in the laboratory.

Describe experiments to show (1) that ammonia contains nitrogen and hydrogen and (2) that it contains 1 volume of nitrogen to 3 volumes of hydrogen.

2. State Dulong and Petit's law and explain how it is used to find the atomic weight of an element.

0.869 gram of the chloride of an element was dissolved in water and treated with excess of silver nitrate. 1.912 gram of silver chloride was precipitated. The specific heat of the element was 0.055. Find its exact atomic weight.

3. How would you prepare a sample of sulphur dioxide from sulphur?

How would you prove the formula for sulphur dioxide?

4. A pure sample of a salt was dissolved in water and when a portion of the solution was treated with hydrochloric acid and hydrogen sulphide, no precipitate was formed. When another portion was treated with ammonium chloride and ammonia, a white precipitate appeared. Barium chloride was added to a third part, whereupon a white precipitate, insoluble in hydrochloric acid was thrown down. What, in your opinion, was the salt and what further tests would you make to confirm it?

5. How is phosphorus manufactured and how is yellow phosphorus converted into red phosphorus?

Compare the properties of yellow and red phosphorus.

6. If you were given a sample of commercial zinc, how would you prepare from it pure samples of (a) crystalline zinc sulphate, (b) zinc oxide and (c) zinc carbonate?

7. What is the chief raw material used for the manufacture of washing soda and where does it occur?

Give an account of a process for the manufacture of washing soda.

8. Describe a method for determining the vapour density of a volatile liquid.

Explain the importance of vapour density in establishing the molecular formulæ of compounds.

9. Describe a method for the preparation of *pure* carbon monoxide in the laboratory and give a brief account of its properties.

How has the formula for carbon monoxide been established?

10. Write structural formulae for (a) formaldehyde, and (b) acetaldehyde and give reasons in support of these formulæ.

State what you know about the chemical properties of the aldehydes.

11. Write the structural formula for any fat.

Describe the manufacture of soap and show by an equation the chemical changes that take place during the process.

12. Write the structural formula for oxalic acid and show by an equation how the acid is acted on by a solution of potassium permanganate in the presence of dilute sulphuric acid.

20 cc. of a solution of oxalic acid required 17.8 ccs. of a decinormal solution of potassium permanganate to oxidise it. How many grams of oxalic acid were contained in 1 litre of the solution?