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(Department of Education.)

LEAVING CERTIFICATE EXAMINATION, 1944.

CHEMISTRY—HONOURS.

TUESDAY, 20th JUNE.—MORNING, 10 TO 12.

Not more than *six* questions to be answered. All questions are of equal value.

1. Describe an experiment to show that carbon dioxide contains its own volume of oxygen.

From the following data how would you prove the formula of carbon dioxide?

- (a) Carbon dioxide contains its own volume of oxygen.
- (b) Weight of one litre of carbon dioxide at N.T.P. : 1.98 gram.
- (c) Weight of one litre of hydrogen at N.T.P. : 0.09 gram.
- (d) Atomic weights : Carbon = 12 : Oxygen = 16.

2. A mixture of *two* salts was dissolved in water and when an excess of hydrochloric acid was added to the solution, a white precipitate was thrown down. The solution was filtered from the precipitate and when hydrogen sulphide was added to the filtrate, a brown precipitate appeared. What metals would you suspect might be present and what further tests would you make in order to identify them exactly?

3. Describe (with diagram and equation) a method for the preparation of sulphur dioxide from sulphuric acid in the laboratory.

State what you know about the properties of sulphur dioxide and describe briefly a method for making sulphuric acid from it.

4. Define the terms (a) equivalent ; (b) atomic weight ; (c) normal solution.

0.3 gram of a metallic element was dissolved in 25 cc of normal acid. When the metal had all dissolved, 15.8 cc of normal alkali were required to neutralise the excess of acid. The specific heat of the metal was 0.092. Find the equivalent and the *exact* atomic weight of the element.

5. Write the names and formulæ of as many oxides of nitrogen as you can.

Describe a method for the preparation of *any one* of them and give an account of its properties.

6. How would you obtain (a) quicklime from calcium chloride; (b) caustic soda from common salt; (c) alumina from aluminium sulphate; (d) zinc sulphide from zinc sulphate?

7. Mention the chief ore of phosphorus and state where it occurs. How would you obtain phosphorus from a phosphate and how would you convert it into orthophosphoric acid?

8. "When an acid, a base or a salt is dissolved in water, it is ionised." Explain this statement.

What ions are formed when each of the following substances is dissolved in water? (a) hydrochloric acid; (b) acetic acid; (c) caustic soda; (d) sodium sulphate; (e) potassium chloride.

9. Give an account of an important discovery made by *any one* of the following: (a) Scheele; (b) Ramsay; (c) Mendeléeff.

10. Give an account of the process for the manufacture of quicklime and write an equation to illustrate the chemical change that takes place during the process.

How would you convert quicklime into (a) slaked lime, and (b) bleaching powder?

11. Write structural formulæ for (a) ethane; (b) ethylene, and (c) acetylene.

Discuss the differences in properties between these three compounds.

12. State what you know about *any two* of the following substances: (a) acetaldehyde; (b) acetic acid; (c) ethyl alcohol.