

AN ROINN OIDEACHAIS

(Department of Education).

BRAINNSE AN MHEADHON-OIDEACHAIS

(Secondary Education Branch).

LEAVING CERTIFICATE EXAMINATION, 1939.

LOWER COURSE.

CHEMISTRY.

FRIDAY, 16th JUNE.—AFTERNOON, 4 P.M. TO 6 P.M.

(a) Not more than *six* questions to be attempted. All questions are of equal value.

(b) Chemical reactions should be expressed in words *and represented by chemical equations*.

(c) Answers should be illustrated by sketches wherever possible.

1. Describe, in detail, how natural waters may acquire "temporary hardness."

What chemical reaction takes place on adding (a) limewater, (b) soap, to temporarily hard water?

What reaction takes place when temporarily hard water is boiled?

2. Explain any *five* of the following terms, illustrating your answer by *one* suitable example in each case:—

(a) Valency, (b) reducing agent, (c) acid salt, (d) catalysis, (e) reversible reaction, (f) supersaturated solution, (g) dibasic acid.

3. Name *three* elements each of which can exist in more than one modification.

What are the different modifications of an element called?

Describe the characteristic properties of the different varieties of any *one* of the elements you have chosen and state how one of its less familiar varieties may be prepared from a commoner one.

4. How may nitrous oxide be prepared and collected ?

How may nitrous oxide be distinguished readily from (a) nitric oxide, (b) oxygen ?

Assuming that nitrous oxide contains nitrogen and oxygen, how would you show, in a simple manner, that it is a *compound*, and not a mixture, of these two gases ?

5. What are (a) basic oxides, (b) acidic oxides, (c) neutral oxides ?

To which of the above groups does each of the following oxides belong :- (d) carbon monoxide, (e) carbon dioxide, (f) cupric oxide, (g) calcium oxide ? Give a reason, in each case, for assigning the oxide to a particular group.

6. What "drying agent" is generally used in the preparation of *dry ammonia* ? Explain why this substance finds favour as a drying agent in this case.

(a) What chemical reaction takes place when ammonia is passed over heated copper oxide ?

(b) What is the action of chlorine on ammonia ?

(c) How are the results of (a) and (b) used in the determination of the composition of ammonia ?

7. State Gay Lussac's Law of Volumes.

In what way did Avogadro account for the simplicity of Gay Lussac's Law ?

Assuming the results of the measurement of the composition of steam by volume, show that the molecule of oxygen must contain at least two atoms.

8. Describe a convenient method for the preparation of hydrogen sulphide.

A solution was made by dissolving 3.19 grams of anhydrous copper sulphate in water. What minimum weight of hydrogen sulphide would be required to precipitate completely the copper as cupric sulphide ?

[H=1, O=16, S=32, Cu=63.5.]

9. Using common salt as a starting substance, and using common chemical reagents, how may a sample of chlorine gas be prepared ?

Describe the characteristics of chlorine and explain why moist chlorine has bleaching properties.

10. Write the structural formula of ethyl alcohol, and find the percentage, by weight, of combined hydrogen in the compound.

0.5 gram of ethyl alcohol was burned completely in oxygen. What volume of carbon dioxide, measured dry at 27°C . and 760 mms. pressure, was produced?

[H=1, C=12, O=16; Gram-molecular volume of a gas=22.4 litres at S.T.P.]

11. Starting with (say) 10 grams of the correct metal in suitable physical condition, in each case, how may reasonable quantities of any *two* of the following substances be prepared in fairly pure condition:—

(a) ferrous sulphide, (b) litharge, (c) lead chloride, (d) sodium nitrite?

12. What is the essential difference between a "hydrocarbon" and a "carbohydrate"?

Give the names and molecular formulae of *two* hydrocarbons and of *two* carbohydrates, and state how the presence of any *one* element in one of these compounds may be detected.