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(Department of Education).

LEAVING CERTIFICATE EXAMINATION, 1957.

CHEMISTRY.—HONOURS.

WEDNESDAY, 12th JUNE.—AFTERNOON, 3 TO 5.30.

Not more than six questions may be attempted.

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

Atomic Weights: H=1, C=12, O=16, S=32, Cl=35.5, K=39, Mn=55, Fe=56.

1. Describe, with a sketch of the apparatus, how you would prepare and collect dry ammonia.

Describe the physical and chemical properties of ammonia.

Give an account of how you would measure the volume composition of ammonia.

[66 marks.]

2. Describe, with the aid of a diagram, how you would prepare and collect hydrogen sulphide.

Give an account of the physical properties of hydrogen sulphide.

Describe the action of hydrogen sulphide on (i) a solution of potassium permanganate acidified with sulphuric acid, (ii) a solution of potassium dichromate acidified with sulphuric acid, (iii) nitric acid, (iv) an acid solution of stannous nitrate, (v) an acid solution of copper nitrate, (vi) chlorine. Illustrate the reactions by means of equations.

[66 marks.]

3. State the positions in the Periodic Table occupied by copper and silver.

Give an account of the chemistry of one of these two elements.

Starting from copper describe the preparation of cuprous chloride.

[66 marks.]

4. Describe fully how you measure the relative density of carbon dioxide.

Show how the relationship between the relative density of a gas and its molecular weight may be established.

50 c.c. of carbon dioxide diffuses in 100 seconds. Calculate the volume of hydrogen which would diffuse in 40 seconds under the same conditions.

[66 marks.]

5. Describe how you would prepare an approximately $\frac{N}{10}$ solution of potassium permanganate and how you would standardise it.

23 c.c. of $1.1 \frac{N}{10}$ potassium permanganate solution are required to completely oxidise 20 c.c. of a given ferrous sulphate solution. Calculate the strength of the ferrous sulphate solution in terms of (i) decinormality, (ii) grams of crystalline ferrous sulphate ($\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$) per litre, (iii) grams of iron per litre.

[66 marks.]

6. Write a short note on each of the following (a) electron, (b) proton, (c) neutron, (d) nuclear charge, (e) atomic number, (f) ion.

Name two elements other than hydrogen and show diagrammatically the structure of an atom of each. Give the atomic number of each of these elements.

[66 marks.]

7. Describe three chemical reactions to distinguish (i) sulphates from sulphites, (ii) nitrates from nitrites, (iii) ferrous salts from ferric salts. Write chemical equations to illustrate each of the reactions described.

[67 marks.]

8. Describe the manufacture of cement.

[67 marks.]

9. Describe the chemical properties of (i) formic acid, (ii) acetic acid, (iii) oxalic acid.

Write the structural formula of each of the above compounds and state the evidence on which the structural formula is based in the case of any *one* of them.

[67 marks.]

10. In the case of each of any *three* of the following compounds (a) ethane, (b) acetylene, (c) glycerine, (d) acetaldehyde, (e) glucose, give the structural formula and the principal physical and chemical properties.

[67 marks.]