AN ROINN OIDEACHAIS

(Department of Education.)

LEAVING CERTIFICATE EXAMINATION, 1942.

CHEMISTRY—HONOURS.

FRIDAY, 12th JUNE.—AFTERNOON, 4 TO 6.

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

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

(*c*) Answers should be illustrated with suitable sketches.

(H=1, N=14, O=16, S=32, Cl=35·5, K=39, Mn=55, Fe=56.)

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1. Explain the following terms, illustrating your answer by *one* suitable example in *each* case :—(*a*) atom, (*b*) compound radicle, (*c*) gram-molecule, (*d*) reversible reaction, (*e*) dibasic acid.

2. What is the connection between the equivalent of an element, its valency, and its atomic weight ?

3·398 grams of a metallic nitrate were completely converted into the chloride of the metal, and 2·868 grams of the chloride were obtained. Find (*a*) the equivalent of the metal, (*b*) the exact atomic weight of the metal, if the specific heat of the metal is 0·056.

3. Describe fully any method for the commercial production of chlorine. How may chlorine be used to make bleaching powder ?

4. What reaction takes place when a solution of sodium carbonate is added to a solution of copper sulphate ? Suggest a method, based on the foregoing reaction, by which a sample of copper sulphate could be converted into a reasonably pure sample of copper nitrate. How may copper nitrate be converted into copper oxide ?

5. Give an account of *two* laboratory methods for the preparation of carbon monoxide.

Summarize the properties of carbon monoxide.

State briefly how you would determine the percentage of carbon monoxide in a mixture of carbon monoxide and carbon dioxide.

6. Write a description of the *commercial* preparation, by the leaden chamber process, of sulphuric acid.

In what way should concentrated sulphuric acid be diluted ? Give reasons.

7. Illustrate by means of equations the reactions which take place when nitric acid acts on the following metals :—(*a*) tin, (*b*) zinc, (*c*) copper. How may it be shown that nitric acid contains nitrogen ?

8. Write notes on the contributions to chemical knowledge of any three of the following :—Priestley, Davy, Graham, Mendeléeff, Scheele.

9. The metallic radicle of a given salt is either magnesium or zinc, and the acidic radicle is either chloride or sulphate. What main *chemical* qualitative tests would you perform to ascertain the nature of the given salt, and what confirmatory tests would you apply ?

10. The concentration of a certain solution of green vitriol ($FeSO_4$, $7H_2O$) was determined by the " permanganate " method and it was found that the iron present in 20 c.c. of the original solution required, for its oxidation, 18 c.c. of a 1·2 $\frac{N}{10}$ solution of potassium permanganate. Express the concentration of the green vitriol solution (*a*) in terms of decinormality, (*b*) in grams of green vitriol per litre.

11. Describe fully a method by which beet-sugar may be converted into ethyl alcohol. Give an account of the main chemical changes which take place and mention the conditions under which such changes occur.

12. Write a brief essay on " Valency."