

AN ROINN OIDEACHAIS

(Department of Education).

LEAVING CERTIFICATE EXAMINATION, 1955.

CHEMISTRY.—HONOURS.

WEDNESDAY, 15th JUNE.—AFTERNOON, 3 TO 5.

Not more than *six* questions to be answered.

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

Atomic Weights :—H=1, O=16, S=32, K=39, Mn=55, Fe=56.

1. Describe, with the aid of a sketch of the apparatus, how you would prepare a reasonably pure sample of nitrogen peroxide in gaseous form.

Give an account of its physical properties and discuss the changes which it undergoes with change of temperature.

Describe how you would investigate the action of nitrogen peroxide on *one* of the following :—(i) water, (ii) potassium iodide, (iii) copper. Illustrate by means of equations any chemical changes which take place.

[66 marks.]

2. What is meant by the following :—(a) molecular weight, (b) vapour density, (c) gaseous diffusion ?

Describe how you would measure the relative rates of diffusion of two gases.

Under similar conditions, 300 c.c. of hydrogen and 250 c.c. of another gas diffuse in 12 secs. and 46.9 secs., respectively. Calculate the molecular weight of this other gas and explain your method.

[66 marks.]

3. Describe fully how you would measure the volume composition of steam.

What information regarding the molecule of water and the molecule of hydrogen may be deduced from the results of that experiment ?

[66 marks.]

4. Explain, with the aid of examples, what is meant by (a) ions, (b) electrolytic dissociation.

Describe fully, with the aid of a sketch, an electrolytic method for the production of chlorine on a commercial scale and explain as fully as you can the changes which take place.

Mention two important industrial uses of chlorine.

[66 marks.]

5. Starting with phosphorous, describe how you would prepare a reasonably pure sample of ortho-phosphoric acid. Describe the properties of the acid and give an account of the experimental work you would do to investigate its basicity.

[66 marks.]

6. In the case of each of the following pairs of substances, describe *two chemical tests* to distinguish between the substances and illustrate the reactions involved by means of chemical equations:—(a) ferrous sulphate and ferric sulphate, (b) lead nitrate and silver nitrate, (c) magnesium chloride and calcium chloride, (d) potassium nitrite and potassium sulphite.

[66 marks.]

7. Describe how you would prepare from tin samples of its chlorides. Write down the chemical formulae for those substances and give an account of their properties.

State the position in the Periodic Table occupied by tin and give an account of those properties of it which justify its occupying that position.

[67 marks.]

8. What are the characteristic properties of aldehydes?

Write the structural formula for acetaldehyde and state the evidence on which it is based.

Describe *two chemical tests* to distinguish between acetaldehyde and formaldehyde and mention one important use of formaldehyde.

[67 marks.]

9. 100 c.c. of a given solution of iron alum, $\text{Fe K}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$, in water were reduced with hydrogen and the reduced solution was made up to 250 c.c. with distilled water. It was found by titration that 10 c.c. of a solution of potassium permanganate ($1.25 \frac{\text{N}}{10}$) were required to oxidise 50 c.c. of that solution. Calculate the weight of iron alum in a litre of the given solution and describe fully how you would perform the operations mentioned above.

[67 marks.]

10. Describe, with the aid of a sketch of the apparatus, how you would (i) prepare and collect a sample of dry sulphur dioxide, (ii) obtain a sample of sulphur trioxide from sulphur dioxide.

In the case of each of *two* of the following pairs of substances, describe how you would demonstrate the change which takes place when the substances interact and write a chemical equation to illustrate the action:—

(a) sulphur dioxide and potassium permanganate,

(b) sulphur trioxide and barium monoxide,

(c) sulphur dioxide and potassium iodate,

(d) sulphur dioxide and lead peroxide.

[67 marks.]