

AN ROINN OIDEACHAIS

(Department of Education).

INTERMEDIATE CERTIFICATE EXAMINATION, 1951.

SCIENCE (Syllabus A).

WEDNESDAY, 13th JUNE.—MORNING, 10 TO 12.

[Not more than *six* questions are to be attempted, of which *three* must be taken from Section I, and *three* from Section II. Illustrate your answers wherever possible. All questions are of equal value.]

SECTION I.

1. Describe how you would measure (a) the length of a curved line, (b) the area of an irregular figure.

2. Describe how you would measure accurately (a) the specific gravity of a liquid, (b) the specific gravity of sand.

3. Explain with the aid of a diagram how each of the following works: (a) a common pump, (b) a simple siphon.

What is the greatest height, in metres, to which a common pump could raise sea-water of specific gravity 1.03 when the pressure of the atmosphere is 1.03 kilograms per square centimetre?

4. Sketch the apparatus you would use and explain how you would use it to measure the coefficient of linear expansion of a metal. Make a list of the measurements you would make and show clearly how you would calculate the coefficient from them.

5. Describe fully how you would measure the specific heat of a given liquid.

A piece of copper weighing 100 gms. is heated to 100°C. and lowered into 50 gms. of a liquid at 15°C. contained in a copper calorimeter weighing 40 gms. Calculate the temperature of the mixture.

(Specific heat of copper=0.09; specific heat of liquid=0.6.)

SECTION II.

6. Describe fully how you would find (a) the percentage of water of crystallisation in washing soda, (b) the percentage of blue-stone in a mixture of blue-stone and sand.

7. Describe how you would prepare and collect oxygen in the laboratory.

Describe, also, how you would burn each of the following in oxygen: sodium, sulphur, magnesium. How are oxides classified? How would you find out the class to which the oxide of each of the above elements belongs?

8. Explain what may be observed and name the products formed when

- (a) limestone is heated strongly,
- (b) calcium is heated in an open crucible,
- (c) carbon dioxide is passed into limewater,
- (d) water is added slowly to quicklime,
- (e) hydrochloric acid is added to quicklime.

Give an account of the properties of the products obtained in (a).

9. Sketch the apparatus you would use and explain fully how you would use it to measure, at room temperature and at atmospheric pressure, the volume of hydrogen evolved when a certain weight of zinc reacts with an acid.

State the approximate weight of zinc and the kind of acid you would use in this experiment.

Show clearly how you would calculate the equivalent weight of zinc from the experimental measurements.

10. Describe the preparation and properties of nitric oxide.

How would you show that nitric oxide contains (a) nitrogen, (b) oxygen ?

3. Explain with the aid of a diagram how each of the following works: (a) a common pump, (b) a simple siphon. What is the greatest height in metres to which a common pump could raise a water of specific gravity 1.03 when the pressure of the atmosphere is 1.03 kilograms per square centimetre?

4. Sketch the apparatus you would use and explain how you would use it to measure the coefficient of linear expansion of a metal. What is the apparatus you would make and show clearly how you would calculate the coefficient from them.

5. Describe fully how you would measure the specific heat of a given liquid. A piece of copper weighing 100 grams is heated to 100°C. and lowered into 200 grams of a liquid at 15°C. contained in a copper calorimeter weighing 40 grams. Calculate the temperature of the mixture. (Specific heat of copper = 0.09; specific heat of liquid = 0.5.)

Section II

6. Describe fully how you would find (a) the percentage of water of crystallisation in washing soda, (b) the percentage of potassium in a mixture of potassium and sand.

7. Describe how you would prepare and collect oxygen in the laboratory.

8. Describe also how you would burn each of the following in oxygen: sodium, sulphur, magnesium. How are oxides identified? How would you find out the class to which the oxide of each of the above elements belongs?