AN ROINN OIDEACHAIS

INTERMEDIATE CERTIFICATE EXAMINATION, 1962.

SCIENCE (Syllabus A).

THURSDAY 14*th JUNE*.—EVENING, 3 TO 5.30.

(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 by means of diagrams wherever possible.)

SECTION I.

1. What is meant by "centre of gravity"?

Describe how you would find, by experiment, the centre of gravity of an irregularly-shaped thin piece of cardboard.

When a uniform metre-stick is suspended by a thread at the 40 cm. mark and a mass of 30 gm. is suspended from the 10 cm. mark the system is in equilibrium. Find the mass of the metre-stick. (66 marks.)

2. Describe fully, with the aid of a diagram, how you would find (i) the melting-point of a given substance, (ii) the boiling-point of a given liquid.

Describe how you would show experimentally the effect of (a) dissolved solids, (b) reduced pressure, on the boiling-point of water. (66 marks.)

3. State the Principle of Archimedes and describe fully how you would demonstrate it by experiment.

A solid weighs 10 gm. in air and 1 gm. in water. Calculate (i) its volume, (ii) its specific gravity. What would the solid weigh in a liquid of specific gravity 0·9? (66 marks.)

4. Define density.

Describe fully, with the aid of a diagram, how you would find the density of the air.

If the density of air at 10°C. is 0·001248 gm. per c.c., what will its density be at 39°C., assuming that the pressure remains constant? (67 marks.)

5. What do you understand by (i) a calorie, (ii) the specific heat of copper, (iii) the latent heat of steam?

Describe fully how you would measure the specific heat of copper.

3 gm. of ice at 0°C. were added to 46·25 gm. of a liquid at 40°C. If the specific heat of the liquid is 0·8 and if the latent heat of fusion of ice is 80 cals. per gm., calculate the temperature of the mixture when all the ice has melted. (The heat content of the containing vessel may be neglected.) (67 marks.)

SECTION II.

6. State what you understand by each of the following, giving an example in each case:- (i) filtration, (ii) evaporation, (iii) condensation, (iv) crystallisation, (v) distillation, (vi) sublimation. Refer to the part, if any, played by heat in each case. (66 marks.)

7. Describe how you would show experimentally that the air contains (i) oxygen, (ii) nitrogen, (iii) carbon dioxide, (iv) water vapour.

Give an account of the composition of the air and describe the properties of oxygen. (66 marks.)

8. What is meant by allotropy? Describe the preparation and properties of the three common allotropes of sulphur. How may it be shown that they are allotropes?

Describe the preparation and properties of sulphur dioxide. (66 marks.)

9. Define (i) element, (ii) compound.

Describe the properties of each of the following substances and name the elements in each:- (a) quicklime, (b) nitric oxide, (c) common salt, (d) bluestone.

Describe how you would prepare and collect nitric oxide. (67 marks.)

10. Define chemical equivalent of an element.

Describe, with the aid of a diagram, how you would find the chemical equivalent of magnesium by displacing hydrogen. Mention the precautions you would take in order to get a good result and show how you would calculate the equivalent. (67 marks.)