AN ROINN OIDEACHAIS

(Department of Education).

INTERMEDIATE CERTIFICATE EXAMINATION, 1950.

SCIENCE (Syllabus A).

THURSDAY, 15th 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. What is a lever ?

If you were given a metre stick, some thread and a known weight, describe how you would (a) weigh a given object, (b) find the weight of the metre stick.

2. Describe how you would (a) apply the Principle of Archimedes to measure the volume of a piece of metal, (b) use a *U*-tube to measure the specific gravity of methylated spirits.

Explain fully your method in each case.

3. State Boyle's law and describe an experiment to test it.

A mass of air having a volume of 200 c.c. is enclosed in a gas jar inverted in a trough of mercury, and the level of the mercury inside the gas jar is 3 inches higher than the level of the mercury in the trough. If mercury is poured into the trough until it is at the same level as the mercury in the gas jar, what will be the change in volume of the enclosed air ?

[Atmospheric pressure=30 inches of mercury.]

4. Define (a) calorie, (b) specific heat.

Describe, with the aid of diagrams, how you would measure the specific heat of a metal. Make a list of the necessary measurements and show clearly how you would calculate the specific heat from them.

Explain why certain precautions are necessary in order to obtain a reasonably accurate result.

5. What do you understand by (a) the boiling point of a liquid, (b) the melting point of a solid, (c) latent heat of steam, (d) latent heat of fusion of ice ?

When heat is supplied at a constant rate to a mass of ice, all the ice is melted after 7·9 minutes, and 10·1 minutes later the temperature of the water formed is 100°C. Calculate the latent heat of fusion of ice.

Section II.

6. What do you understand by the solubility of a salt ? How is the solubility of substances usually affected by change of temperature ?

Describe fully how you would measure the solubility in water of common salt at 60°C.

7. How would you show by means of laboratory experiments, one in each case, that atmospheric air contains (a) water vapour, (b) carbon dioxide, (c) nitrogen ?

Describe fully how you would measure the percentage of nitrogen by volume in atmospheric air.

8. Describe, with the aid of a diagram, how you would prepare and collect nitrous oxide. Give an account of the properties of nitrous oxide.

If you were given two gas jars, one filled with nitrous oxide and the other filled with oxygen, describe one experiment to ascertain which of them contains oxygen.

9. Explain the terms " acid " and " alkali."

Describe, with the aid of a diagram, how you would prepare nitric acid, and give an account of its properties.

How would you prepare a pure sample of potassium nitrate from nitric acid ?

10. Describe in detail how you would find by experiment the volume of oxygen at room temperature and at atmospheric pressure evolved on heating 1 gram. of potassium chlorate.

When 1 gram. of potassium chlorate is heated, 296 c.c. of oxygen at 12°C and 730 mm. are evolved and the residue weighs 0·61 gram. Calculate the weight of a litre of oxygen at S.T.P. from these figures.