

INTERMEDIATE CERTIFICATE EXAMINATION, 1966

SCIENCE (Syllabus A)

WEDNESDAY, 15th JUNE - Morning, 10 to 12.30

(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. State the Principle of Archimedes and describe fully how you would demonstrate the principle by experiment.

A piece of metal weighs 15.4 gm. in air, 13.4 gm. in water and 12.4 gm. in a given liquid. Calculate the density of the metal and, also, the density of the liquid.

(66 marks)

2. State what you understand by (i) mass, (ii) force, (iii) weight.

State the law of the lever and give an account of an experiment in support of your answer.

Describe, with the aid of a diagram, how you would use a given weight to find the weight of a metre-stick.

(66 marks)

3. Describe fully, with the aid of a diagram, how you would construct a mercury barometer. Show how you would use the barometer to measure the pressure of the atmosphere.

Give an account of an experiment to show the effect (i) of increased pressure, (ii) of reduced pressure, on the boiling point of a given liquid.

(66 marks)

4. Define (i) a calorie, (ii) specific heat of a liquid.

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

A copper calorimeter weighing 20 gm. contains 28 gm. of water at 35.5°C. A lump of ice which has been dried is added to the calorimeter and when the ice has melted the water in the calorimeter has a steady temperature of 30°C. Calculate the mass of the lump of ice, assuming that the latent heat of fusion of ice is 80 cal. per gm. and the specific heat of copper is 0.1.

(67 marks)

5. Define the coefficient of linear expansion. Describe fully how you would measure the coefficient of linear expansion of copper.

If the coefficient of linear expansion of a metal is α , show that the coefficient of cubical expansion of that metal is 3α , where α is very small.

(67 marks)

SECTION II

6. Describe fully how you would prepare and collect hydrogen and give an account of its properties.

Outline any other method by which hydrogen may be prepared.

When hydrogen was passed over 0.794 gm. of a heated metal oxide, 0.634 gm. of the metal was obtained. Find the chemical equivalent of the metal.

(66 marks)

7. Describe fully how you would show by experiment that the air contains (i) oxygen, (ii) carbon dioxide, (iii) nitrogen.

Write down the approximate composition of the air.

Caustic soda pellets deliquesce on exposure to the air. What may be deduced from this with regard to the composition of the air?

(66 marks)

8. Give an account of each of any four of the following compounds with regard to appearance, effect (if any) of water, effect (if any) of heat:- (i) ammonium chloride, (ii) mercuric oxide, (iii) carbon dioxide, (iv) potassium nitrate, (v) anhydrous copper sulphate, (vi) crystalline ferrous sulphate.

Name the elements present in the four compounds you select.

(66 marks)

9. What is an oxide? Describe briefly how oxides are classified.

Give an account of how you would prepare and collect nitrous oxide.

Describe the properties of nitrous oxide.

(67 marks)

10. Describe, with the aid of a diagram, how you would prepare and collect sulphur dioxide and give an account of its properties.

A given mass of gas has a volume of 760 c.c. at 27°C. and at a pressure of 900 mm. of mercury. Find its volume at S.T.P.

(67 marks)