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INTERMEDIATE CERTIFICATE EXAMINATION, 1956.

SCIENCE (Syllabus A).

TUESDAY, 12th JUNE.—Evening, 3 to 5.

[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.]

SECTION I.

1. Describe, with the aid of a sketch, how you would use (a) a graduated cylinder to measure the volume of a piece of metal, (b) a burette to deliver 30 c.c. of a liquid into a beaker, (c) a hydrometer to measure the specific gravity of a given liquid.

[66 marks.]

2. What is a lever ?
If you were given a metre stick, a retort stand, a known weight and some pieces of thread, describe how you would find (a) the weight of a given object, (b) the weight of the metre stick.
In each case, illustrate your method by means of a sketch and state the principle applied.

[66 marks.]

3. Describe in detail, with a sketch of the apparatus, how you would measure the coefficient of apparent expansion of a liquid and explain your method fully.
The density of a liquid at 0°C. is 0·78 gm. per c.c. Find, correct to two places of decimals, the density of the liquid at 45°C., assuming that its coefficient of absolute expansion is 0·0011.

[66 marks.]

4. Describe fully how you would measure the latent heat of fusion of ice.
A vessel, of water equivalent 21 gms, contains 200 gms. of water at 40°C. Assuming that the latent heat of fusion of ice is 80 calories per gm., calculate the least mass of ice at 0°C. which must be put into the vessel to reduce the temperature of the whole to 5°C.

[67 marks.]

5. Describe fully a method for measuring the specific gravity of ice.
Assuming that the specific gravities of ice and sea-water are 0·92 and 1·05, respectively, calculate, correct to two places of decimals, what percentage of the total volume of a piece of ice floating in sea-water is above the surface.

[67 marks.]

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SECTION II.

6. Describe, with the aid of a sketch of the apparatus, how you would prepare and collect a sample of oxygen. Give an account of its properties.

[66 marks.]

7. Show, with the aid of a sketch of the apparatus, how you would (a) prepare and collect hydrochloric acid gas, (b) pass the gas into water.

What products are formed when each of the following is added to a solution of the gas in water :—(i) zinc, (ii) caustic soda, (iii) washing soda ?

[66 marks.]

8. Describe, with the aid of a sketch, how you would (a) prepare and collect dry carbon dioxide, (b) measure the mass of a litre of it at S.T.P.

[66 marks.]

9. Give an account of the properties of nitrogen peroxide and describe, with the aid of a sketch of the apparatus, how you would prepare a reasonably pure sample of it.

Tell briefly how you would obtain a sample of nitrogen from it.

[67 marks.]

10. State (a) the law of the conservation of matter, (b) the law of constant composition, and give one example in each case to illustrate the law.

Assuming that the equivalent weight of magnesium is 12 gms. and that at S.T.P. a litre of hydrogen weighs 0·09 gms., calculate the volume of hydrogen, measured at 15°C. and at a pressure of 700 mm. of mercury, which would be released by the action of 1 gm. of magnesium on a suitable acid.

[67 marks.]