

Write your answers to Section B on pages 7—16. If you use any supplementary sheets tie them LOOSELY AT THE BACK of the answer-book before handing it to the Supervisor.

SECTION B.

Answer FIVE questions.

In answering questions in Section B give equations and simple diagrams unless instructed in the question that these are unnecessary. When describing experimental work give practical details of experiments you have done or seen. For the preparation and collection of gases full marks may be obtained by drawing fully-labelled diagrams and stating the equation.

- B 9.** Draw a fully-labelled diagram of the apparatus you would use to prepare and collect oxygen from a mixture of potassium chlorate and manganese dioxide. Give the equation. Explain the part played by the manganese dioxide in this preparation.
- How could you liberate chlorine from the residue obtained after the mixture has been heated until no further oxygen is evolved?
- * How, and under what conditions, does hydrogen react with (a) oxygen, (b) chlorine?
- What volume of hydrogen would be required to combine separately with 100 c.c. of (a) oxygen, (b) chlorine, all volumes being measured at the same temperature and pressure?
- B 10.** Starting from flowers of sulphur, describe how you would prepare (a) good rhombic crystals, (b) monoclinic (prismatic) crystals, (c) plastic sulphur.
- How and under what conditions do sulphur and iron filings react together? By what chemical test, other than the action of heat, would you distinguish between the product of this reaction and a mixture of sulphur and iron filings? Give the result of the test in each case.
- B 11.** Give a fully-labelled diagram to illustrate the usual laboratory preparation and collection of dry ammonia gas from ammonium chloride. Give the equation.
- * Under what conditions do hydrogen and nitrogen combine together directly in the Haber process?
- How would you show the use of ammonia as a reducing agent?
- B 12.** Explain how, starting from limestone, you would prepare (a) quicklime, (b) lime-water, (c) calcium bicarbonate solution.
- + Describe and explain what happens when (i) hydrated calcium nitrate is heated, (ii) concentrated solutions of calcium nitrate and sodium sulphate are mixed.
- B 13.** Give the name and formula of a common ore of zinc, and describe how zinc is extracted from it.
- How, and under what conditions, does zinc react with (a) sulphuric acid, (b) lead nitrate?
- * Mention two industrial uses of zinc.
- B 14.** Who first isolated sodium? Explain why he failed to obtain sodium by the electrolysis of sodium hydroxide solution but succeeded when he used fused sodium hydroxide.
- Give a fully-labelled diagram to illustrate the modern method of extracting sodium by the electrolysis of fused sodium chloride. Indicate clearly the ions present, the materials, names and signs of the electrodes, and the products. Give ionic equations for the reactions taking place at the electrodes.
- B 15.** Describe the manufacture of coal gas and name its three chief constituents. (Diagrams of the plant are not required.)
- Name three other main products obtained in this process, and give one use for each of them.
- B 16.** Give two chemical properties in each case (apart from their action on indicators) which are characteristic of (a) a dilute acid, (b) an alkali.
- Describe in detail how you would prepare (i) dry cupric sulphate crystals from cupric oxide, (ii) dry cupric oxide from cupric sulphate solution.