

# A/R I

## OXFORD LOCAL EXAMINATIONS GENERAL CERTIFICATE OF EDUCATION

Summer Examination, 1951

Advanced and Scholarship Level

### CHEMISTRY, PAPER I

FRIDAY, JUNE 22. TIME ALLOWED—3 HOURS

[Write the number of the paper, R I, on the left at the head of each sheet of your answers in the space provided.]

Answer SIX questions, selecting at least ONE but not more than TWO from each of the Sections B and C.]

#### SECTION A

1. Describe the preparation of ozonized oxygen. How does ozone react with (a) potassium iodide; (b) lead sulphide; (c) hydrogen peroxide?

State **two** distinctive tests for ozone.

Give an account of **one** method of establishing the formula of ozone.

2. Describe how you would prepare and isolate specimens of (a) sodium bicarbonate from washing soda; (b) sodium hydrogen sulphite from sodium hydroxide; (c) potassium nitrate from sodium nitrate; (d) ferrous ammonium sulphate from iron filings, ammonium hydroxide, and dilute sulphuric acid.

3. Draw a diagram of the apparatus you would set up to prepare phosphorus trichloride. Briefly describe what you would do to obtain this compound. How does it react with (a) water; (b) ethyl alcohol; (c) acetic acid; (d) chlorine?

Why does carbon tetrachloride not react with cold water?

4. Give details of **one** method in **each** case of making carbon monoxide (a) in the laboratory, (b) on a large scale.

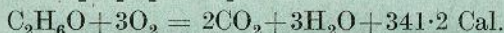
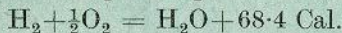
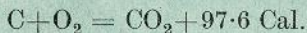
What do you know of the use of carbon monoxide in (i) the extraction of a metal, (ii) the production of an organic compound?

Explain why it is dangerous to run the engine of a car in a closed garage.

### SECTION B

5. What do you understand by the following terms: *endothermic reaction*; *heat of combustion*; *heat of formation*?

State Hess's Law and calculate the heat of formation of ethyl alcohol from the following data:



Explain why the solubility of a substance with a negative heat of solution increases with a rise in temperature.

6. What is a colloidal solution? State exactly how you would prepare colloidal solutions of **three** different substances.

Give an account of the general properties of colloidal solutions.

7. Distinguish between strong and weak electrolytes. Define the terms *specific conductivity* and *equivalent conductivity* of a solution of an electrolyte, and state how they are related. In the case of solutions of a weak electrolyte, state and explain the effect of dilution on the *equivalent* conductivity.

What do you understand by the degree of ionization of a weak electrolyte, and how is this quantity obtained from equivalent conductivity measurements?

## SECTION C

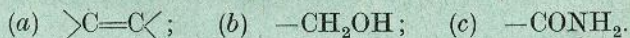
8. Describe how you would prepare a pure specimen of chloroform. Selecting **one** alkyl halide, state **five** of its reactions, representing each by an equation. Name the organic product in each case. How would you detect the element chlorine in chloroform?

9. A pungent-smelling liquid **A**, containing 47.06 per cent. carbon, 5.88 per cent. hydrogen, and no other detectable element, has a vapour density of 51. What is the molecular formula of **A**? Write its structural formula.

Briefly describe how **A** is prepared in the laboratory. How does **A** react with (a) water; (b) methyl alcohol; (c) aniline?

$$[H = 1; C = 12]$$

10. Name the main classes of substances which contain the following groupings:



Give an account of the reactions which you associate with grouping (a) and **either** grouping (b) **or** grouping (c).