Time Allowed: **1** *hour*   **Date: 19th February 2025**

INSTRUCTION: Answer ALL Questions

SECTION A

[handwritten: O P d P — obtain, purify, dry, Reserve]

1. (a) What is a standard solution?   1mk
 (b) Differentiate between primary and secondary standards.   1mk
 (c) Give four (4) examples of primary standards   *[handwritten: Na₂CO₃, Na₂SO₄]*   2mks

2. In the redox equation below, identify the oxidizing and reducing agent in the reaction.   2mks

$$C_6H_8O_6 + 2H^+ + 2NO_2^- \rightarrow C_6H_6O_6 + 2H_2O + 2NO$$

3. Write the molecular formula and structure of Dimethylglyoxime   2mks

4. In an experiment, 4.0982g of potassium hydrogen phthalate ($KC_8H_5O_4$) was dissolved and made up to 250 mL with distilled water, calculate the molarity of $KC_8H_5O_4$ given that K = 39.10, C =12.01, H = 1.008, O = 16.00).   2mks

5. In the preparation of hexamine cobalt (III) chloride, the oxidation step was achieved using what reagent?   1mk

6. In the experiment to determine the acid content of Vinegar, 20cm³ of Vinegar was diluted to 100cm³. 25cm³ of the diluted vinegar was pipetted for determination, using an acid–base titration method. Calculate the corresponding mass of 25cm³ Vinegar used in the acid-base titration (assuming the density of Vinegar is 0.96 g/mL).   3mks

7. State and give an example of four (4) classes of volumetric methods of analysis.   2 mks

8. (i) What are the names of the **indicators** used in the Mohr and Volhard methods of determination of Cl⁻ content of water? (ii) What happens to Volhard indicator in a basic medium?   2mks

9. During an experiment, the following weights were obtained for Neurobion tablets, 29.8, 30.2, 28.6, and 29.7 mg. Calculate the (i) S.D of the data and (ii) S.E of the data.   3mks

10. A 5.0 mL portion of vinegar with a density of 1.008 g/mL requires 42.03 mL of 0.1002 M NaOH solution for titration. Calculate the weight percent (wt%) of acetic acid in the sample.   3mks

11. Write the redox and the overall equations involved in the preparation of Hexamine Cobalt (iii) Chloride.

[handwritten: $2COCl_2 \cdot 6H_2O + 2NH_4Cl + 10NH_3 + H_2O_2 \rightarrow 2Co(NH_3)_6Cl_3 + 14H_2O$]   2mks

12. Write the ionic equation leading to the formation of a red complex after all Ag⁺ has been consumed during chloride determination using Volhard's method.   2mks

13. (a) What is back titration? (b) Why is blank determination carried out during sample analysis? **3mks**