

BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI

First Semester 2023-2024

Mid Sem Exam (Closed Book)

Course Name: Pharmaceutical Analysis

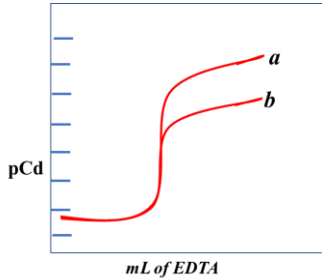
Course No: PHA F211

Total Marks: 30

Date: 13-10-2022

Duration: 90 minutes

Instructions: a) All questions are compulsory; b) Marks will be deducted if calculations are not accompanied by proper explanation; c) Handwriting should be legible; d) Give the answers for all sub-parts together in one place; e) *significant figures* must be considered for all calculations.

- 1) Draw and explain the titration curve between a strong acid (titrand) and weak base (titrant). [3]
- 2) In an aqueous titration of 50 mL of 0.1 M HCl (titrand) with 0.2 M NaOH (titrant) calculate the pH when the titration is 120% complete. [3]
- 3) Using schemes depict the reaction between a) HClO_4 and acetic acid, b) H_2O and acetic acid [2]
- 4) a) Briefly describe the principle of complexometric titrations. [2]
- b) A sample containing Cadmium ions was titrated using EDTA standard solution at two different pH to obtain curves a) and b). Explain which curve was obtained at the higher pH. [2]
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- 5) A 400 mg sample of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ (MW = 249.7) is determined by iodometry using the following sequence of reactions. The released iodine was titrated with 0.1 M standard sodium thiosulfate solution requiring 15 mL to attain the end point.
- a. What is the percentage purity of the sample? [3]
- b. Which external indicator can be used in this titration and what is colour change at end point? [2]
- $$2\text{CuSO}_4 + 4\text{KI} \rightarrow 2\text{CuI}_2 + \text{K}_2\text{SO}_4$$
- $$\text{CuI}_2 \rightarrow \text{Cu}_2\text{I}_2 + \text{I}_2$$
- 6) a) Name two instrumental methods for analysis. [2]
- b) Give two limitations of classical methods. [2]
- c) What is a Pharmacopeia and which agency publishes Indian Pharmacopoeia? [2]
- 7) Describe three ways by which containers can act as source of impurities during the storage of pharmaceutical products. [3]
- 8) A 0.7121 g sample of a protein supplement was analyzed by the Kjeldahl method. The ammonia formed by addition of concentrated NaOH after digestion with H_2SO_4 was distilled into 50.00 mL of 0.05 M HCl. The excess HCl was then back-titrated with 4.00 mL of 0.040 M NaOH. Calculate the percent protein in the supplement considering that on an average there are 5.7 g of protein for every gram of nitrogen. [4]