BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI

First Semester 2022-2023

Mid Sem Exam (Closed Book)

Course Name: Pharmaceutical Analysis **Course No: PHA F211**

Total Marks: 30 **Date: 04-11-2022** **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) draw diagrams/equations wherever needed

1) a) A specific limit test is always desired. Why or why not? Explain with the help of an example. [**2**]

b) What type of limit test would you perform to limit NaCl in Chloramine? [**1**]

2) Consider the titration between 50 mL of 0.1 M HCl with 0.2 M NaOH. Calculate the pH of the solution when the titration is 120% complete. [**3**]

3) a) Calculate the amount of $KMnO_4$ [MW = 158 g/mol, 80% w/w pure] needed to prepare 500 mL of 0.1 N solution. Provide explanation.

b) Provide two important precautions while preparing this solution. [3+2=**5**]

4) a) Provide 2 applications of direct conductometry.

b) Briefly explain the principle of conductometric titration with an example.

c) Draw the conductometric titration curve when a mixture of HCl and CH_3COOH is titrated with NaOH solution. [1+2+3 = **6**]

5) The amount of protein in a protein supplement is determined by Kjeldahl analysis. A 0.9814 g sample was digested and the resulting NH_3 was distilled into a collection flask containing 50.00 mL of 0.1047 M HCl. The excess HCl is then back titrated with 0.1183 M NaOH, requiring 22.84 mL to reach the bromothymol blue end point. Report the %w/w protein in the sample assuming that there is 6.38 g of protein for every gram of nitrogen in most protein products. [**4**]

6) Following is the K_f of the metal ions for complexation with EDTA at a particular pH. [**3**]

i) $Mg^{2+} = 10^{10}$ (pH 10), ii) $Sr^{2+} = 10^{10}$ (pH 10), iii) $Fe^{3+} = 10^{25}$ (pH 2).

Explain, how would you determine Fe^{3+} concentration selectively using complexometry by adjusting pH?

7) Explain in 2-3 sentences, whether following statements are TRUE or FALSE.

a) In Fajan's method large precipiate size is desired. [1+1+1+1+2=**6**]

b) In Mohr's method pH > 9 can not be used.

c) Solubility of CaF_2 can be increased using higher pH.

d) Inclusions can be removed by filtration and washing of precipiates.

e) Concentrated solutions are preffered in Gravimetry.