BACHELOR OF PHARMACY HONOURS - LEVEL 03 - 2018/19
BSU3340- PHARMACEUTICAL CHEMISTRY I
FINAL EXAMINATION

INDEX NO: ....

Part B – 06 Essay Questions

(80 marks)

Write answers in booklets provided.

1. a) An element **Q** belongs to Group III A and another element **R** belongs to Group VII A of the periodic table. Answer the following questions.

    I. How many valance electrons are in **Q**?

    II. How many valance electrons are in **R**?

    III. Which amongst **Q** and **R** is a metal?

    b) Table below shows a part of the periodic table.

Li	Be	B	C	N	O	F
Na	Mg	Al	Si	P	S	Cl

    State what happens as one moves from left to right to,

    I. metallic character:

    II. atomic radius of elements:

    c) Explain your answer in b) I.

                                    (10 marks)

2. a) Which of the following will have intermolecular hydrogen-bonding?

       $CH_3CH_2CH_2OH$, $CH_3CH_2OCH_3$, $CH_3CH_2NH_2$

    b) Ethanol (C_2H_5OH) and Dimethyl ether (CH_3OCH_3) have the same molar mass. Which one has a higher boiling point? Explain your answer.

c) Arrange the following compounds in the order of **increasing** boiling point.

Cl_2 Br_2 I_2

(10 marks)

3. A sample of glacial acetic acid (CH_3COOH) was tested for purity using the following method. A 2.500 g of the acid was transferred to a volumetric flask and diluted up to 100.00 mL mark with water. A 20.00 mL of this solution was titrated with 0.20 M sodium hydroxide solution. 24.50 mL of NaOH was required for complete neutralization.

    a) Write the balanced chemical equation.

    b) Calculate the moles of NaOH and the moles of acetic acid used in the titration.

    c) Calculate the mass of acetic acid in the solution and the purity of the sample. Molecular weight of acetic acid is 60 g/mol.

    (15 marks)

4. a) Write the expression for the solubility product, Ksp, of saturated solution of a metal hydroxide $M(OH)_2$.

    b) If the pH of the solution is 9.88, calculate the pOH.

    c) Calculate the hydroxyl ion concentration in the solution.

    d) Calculate the Ksp for the metal hydroxide.

    (15 marks)

5. Potassium permanganate ($KMnO_4$) can be used in the analysis of Fe (II) content of an iron supplement in the market. In acidic medium, $KMnO_4$ readily reacts with Fe (II). A sample of iron supplement (1.750 g) was dissolved in water and diluted up to 25.0 mL with dilute sulfuric acid. This solution was titrated against 0.0244 M $KMnO_4$ solution. The volume required to reach the end-point was 36.5 mL.

    a) Write the balanced half-reactions for both $KMnO_4$ and Fe (II) in acidic medium.

b) Write the balanced redox reaction between permanganate ion and Fe (II) in the acidic medium.

c) Calculate the number of moles of KMnO4 consumed in the titration.

d) Calculate the number of moles of Fe (II) titrated.

e) What is the mass percentage of Fe (II) in the iron supplement sample? (Atomic mass of iron is 56 g/mol)

(15 marks)

6. A gravimetric analysis was done to determine the mass percentage of silver ion of an impure sample of silver nitrate (AgNO3) as follows. A 1.5 g of sample was dissolved in 50.0 mL of distilled water. Then a solution of sodium chloride was gradually added to the above mixture to precipitate the silver ions as AgCl. Sodium chloride was added until no more precipitate was seen to form. The precipitate was filtered, washed and dried. The mass of the dried precipitate was 1.62 g.

a) Write an equation for the precipitation reaction.

b) Calculate the moles of AgCl precipitated. Atomic mass of Ag = 107.8 g/mol, Cl = 35.4 g/mol

c) Calculate the mass of silver present.

d) Calculate the percentage composition of silver in the original sample.

(15 marks)

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