

(18)

BACHELOR OF PHARMACY HONOURS - LEVEL 3 - 2019/20
BPU1110- GENERAL CHEMISTRY
FINAL EXAMINATION

INDEX NO:

Part B – 04 Questions, Answer all questions

(70 marks)

Write answers in booklets provided.

1. a) Write the electron configurations of the following ions. (03 marks)

Atomic numbers: Al = 13, Br = 35, Fe = 26

Al^{3+} , Br^- , Fe^{2+}

b) Draw the Lewis structures for the following molecules. (03 marks)

NF_3 , SCl_2 , CO_3^{2-}

c) Arrange the following compounds in the order of **increasing** boiling point. (03 marks)

$\text{CH}_3\text{CH}_2\text{OH}$, CH_3OCH_3 , $\text{CH}_3\text{-CH}_3$

d) Name three (03) metals which activate enzymes? (03 marks)

e) Calculate the dissolution enthalpy of AgCl in water using the data provided below. (06 marks)

Lattice energy of AgCl -916 kJ/mol, Solvation energy (Hydration energy) -851 kJ/mol.

f) Determine whether the dissolution process of AgCl is endothermic or exothermic. (02 marks)



2. Consider a weak acid, HA.
- Write the chemical equation for the ionization of HA in an aqueous solution. (02 marks)
 - Derive the Henderson-Hasselbalch equation for HA. (08 marks)
 - When 50.0 g of a monoprotic weak acid is dissolved in 1000 mL of water, ionization percentage of acid is recorded as 2.2. If the acid dissociation constant (K_a) is 6.5×10^{-5} , calculate the formula weight of the acid. (10 marks)
3. During an experiment, a student observed that the solubility (S) of a metal hydroxide $M(OH)_2$ is reduced by a factor of 12 in a 0.0200 M solution of MCl_2 (MCl_2 is a soluble salt).
- Calculate the formal solubility (S) of the metal hydroxide. (09 marks)
 - Calculate the solubility product K_{sp} of the hydroxide. (02 marks)
 - Calculate the solubility of the metal hydroxide (in ppm) in the presence of 0.0200 M MCl_2 solution. Atomic weight of M is 40. (04 marks)
4. A student performed an experiment to find out the molarity of a commercial hydrogen peroxide solution by performing a titration against $KMnO_4$ solution. A 25.00 mL volume of the hydrogen peroxide solution was diluted to 250.0 mL in a volumetric flask. Then 25.00 mL of the diluted solution was mixed with 50 mL of water and 10 mL of 4 M H_2SO_4 and titrated with 0.020 M $KMnO_4$.
- Identify the reducing agent and the oxidizing agent (02 marks)
 - Write the balanced redox reaction between permanganate ion and H_2O_2 in the acidic medium. (07 marks)
 - If the end-point of the titration was observed with 28.50 mL of titrant, calculate the molarity of the commercial H_2O_2 . (06 marks)

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