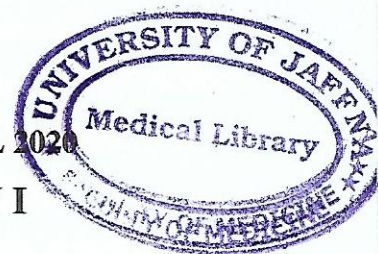


UNIVERSITY OF JAFFNA, SRI LANKA
BACHELOR OF PHARMACY
FIRST YEAR SECOND SEMESTER EXAMINATION –APRIL 2020
PHACH 1273-PHARMACEUTICAL CHEMISTRY I



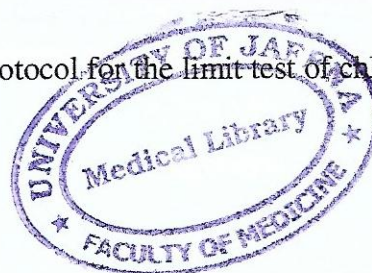
Date: 05.10.2020

Time: 3 Hours

ANSWER ALL THE SIX QUESTIONS

- 1 1.1 1.1.1 Explain the constructive and destructive interference of waves using the suitable example. (35 Marks)
- 1.1.2 The colour orange has a wavelength of about 620 nm. Calculate the wavenumber and frequency of orange light? (20 Marks)
- 1.2 1.2.1 Define "Photoelectric effect". (15 Marks)
- 1.2.2 The threshold wavelength for photoelectric effect emission in tungsten is 225 nm. Calculate the wavelength of radiation that must be used to eject electrons with a maximum kinetic energy of 1.3 eV. ($h=6.626 \times 10^{-34}$ Js, $c=3.0 \times 10^8$ ms⁻¹, 1 eV=1.6 x 10⁻¹⁹ J). (30 Marks)
- 2 2.1 2.1.1 Define "Primary and Secondary valency" of a co-ordination compound. (20 Marks)
- 2.1.2 Indicate the primary and secondary valency of the following compounds.
- 2.1.2.1 $[\text{Cu}(\text{NH}_3)_4]^{2+}$ (10 Marks)
- 2.1.2.2 $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$ (10 Marks)
- 2.2 Give the IUPAC names of the following compounds.
- 2.2.1 $[\text{CoCl}(\text{CNNO}_2)(\text{NH}_3)_3]$ (05 Marks)
- 2.2.2 $[\text{Co}(\text{NH}_3)_5\text{ONO}]\text{Cl}_2$ (05 Marks)
- 2.2.3 $\text{Na}_2[\text{Ni}(\text{Cl})_4]$ (05 Marks)
- 2.2.4 $[\text{Fe}(\text{NH}_3)_6][\text{Cr}(\text{CN})_6]$ (05 Marks)
- Diagrammatically illustrate the possible isomerism of
- 2.3 2.3.1 $[\text{Pt}(\text{NH}_3)(\text{H}_2\text{O})\text{Cl}_2]$ (20 Marks)
- 2.3.2 $[\text{Co}(\text{NH}_3)_5(\text{NO}_2)](\text{NO}_3)_2$ (20 Marks)

- 3 3.1 Predict the geometry of the following compounds using the Valence-Shell Electron Pair Repulsion (VSEPR) theory.
- 3.1.1 SO_2 (20 Marks)
- 3.1.2 BrF_3 (20 Marks)
- 3.2 Sketch the molecular orbitals (bonding and antibonding) formed by the overlapping of the following sets of atomic orbitals.
- 3.2.1 A $2p_x$ orbital and a $2p_x$ orbital along the x-axis. (10 Marks)
- 3.2.2 A $2p_z$ orbital and a $2p_z$ orbital along the z-axis. (10 Marks)
- 3.2.3 A $2s$ orbital and a $2p_z$ orbital along the x-axis. (10 Marks)
- 3.3 Explain the molecular geometry of BeCl_2 and BCl_3 by using Valence bond theory. (30 Marks)
- 4 4.1 For H_2 and He_2 .
- 4.1.1 Draw the molecular orbital energy level diagrams. (20 Marks)
- 4.1.2 Explain why He_2 Molecule does not exist in nature, but H_2 exist. (15 Marks)
- 4.2 For O_2 and CO
- 4.2.1 Draw molecular orbital energy level diagrams. (30 Marks)
- 4.2.2 Write down the molecular orbital electronic configuration of the above molecules. (10 Marks)
- 4.2.3 What kind of magnetic properties do the above molecule have. (05 Marks)
- 4.2.4 Find the bond order of the above molecules and explain the stability of the compound. (10 Marks)
- 4.2.5 What is difference between O_2 and CO molecular orbital diagram. (10 Marks)
- 5 5.1 Write short notes on the followings
- 5.1.1 Cathode rays experiment (30 Marks)
- 5.1.2 Rutherford experiment (30 Marks)
- 5.2 Define "Limit test" (10 Marks)
- 5.3 Briefly describe the principle and a standard protocol for the limit test of chloride. (30 Marks)



- 6 6.1 Briefly describe the qualitative chemical test for I^- and NO_3^- . (40 Marks)
- 6.2 Define the "Complexometric titration" (10 Marks)
- 6.3 A zinc supplement tablet (Zn MW = 65.37 g / mol) was dissolved in 5 mL of distilled water and the total volume was made up to 10 mL. Then 6 drops of the Eriochrome Black T indicator and 5 mL of the buffer solution were added. 14.65 mL of 0.01 molL^{-1} EDTA solution was required to titrate the sample.
- 6.3.1 Write down the possible observation during the titration. (15 Marks)
- 6.3.2 State the possible reactions during the titration. (15 Marks)
- 6.3.3 Calculate the zinc content in mg of the tablet. (20 Marks)

