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 destructives 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 x 10^{-34} Js, C-3.0 x 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 $[Cu(NH_3)_4]^{2+}$ **(10 Marks)**

2.1.2.2 $[Co(NH_3)_6]Cl_3$ **(10 Marks)**

2.2 Give the IUPAC names of the following compounds.

2.2.1 $[CoClCNNO_2(NH_3)_3]$ **(05 Marks)**

2.2.2 $[Co(NH_3)_5ONO]Cl_2$ **(05 Marks)**

2.2.3 Na_2 $[Ni(Cl)_4]$ **(05 Marks)**

2.2.4 $[Fe(NH_3)_6][Cr((CN)_6]$ **(05 Marks)**

Diagrammatically illustrate the possible isomerism of

2.3 2.3.1 $[Pt(NH_3)(H_2O)Cl_2]$ **(20 Marks)**

2.3.2 $[Co(NH_3)_5(NO_2)](NO_3)_2$ **(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 2Pz orbital and a 2Pz 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)**