UNIVERSITY OF JAFFNA, SRI LANKA

BACHELOR OF PHARMACY

FIRST YEAR SECOND SEMESTER EXAMINATION – JULY 2015

PHARMACEUTICAL CHEMISTRY I- PHACH 1273

Date: 13.07.2015   Time: 3 Hours

ANSWER ALL THE SIX QUESTIONS

1   1.1   Write short note on 'Millikan oil drop experiment'.   **(10 Marks)**

    1.2   Define the followings:

          1.2.1 Photoelectric effect   **(10 Marks)**

          1.2.2 Compton effect   **(10 Marks)**

    1.3   Calculate the energy gained by a recoiling free electron from the Compton scattering of photon of wavelength 0.005 nm through an angle of 45 degrees.   **(20 Marks)**

    1.4   When ultraviolet light with a wavelength of 240 nm fell on a particular metal plate, electrons were emitted from plate 1, crossing the gap to plate 2 and causing a current to flow through the wire connecting the two plates. The battery voltage is gradually increased until the current in the ammeter dropped to zero, at which point the battery voltage was 1.40 V (maximum kinetic energy 1.40 eV, $1eV= 1.6 \times 10^{-19}$ J).

          1.4.1 What is the energy of the photons in the beam of light?   **(20 Marks)**

          1.4.2 What is the work function of the metal?   **(10 Marks)**

          1.4.3 What is the longest wavelength that would cause electrons to be emitted, for this particular metal?   **(20 Marks)**

2 2.1 Give IUPAC name of following compounds and ions.

2.1.1 $[Fe(CN)_6]^{3-}$ (05 Marks)

2.1.2 $[Cr(en)_3]^{3+}$ (05 Marks)

2.1.3 $[Co(NH_3)_5ONO]Cl_2$ (05 Marks)

2.1.4 $Na[Cu(CN)_6]$ (05 Marks)

2.2 List different types of isomerism in Co-ordination compounds.   (20 Marks)

2.3 Diagrammatically illustrate the isomerism of

2.3.1 $[Co(en)_2Cl_2]$ Br   (10 Marks)

2.3.2 $[Co(NH_3)_4(NO_2)(SO_4)]$ (30 Marks)

2.3.3 $[Co(en)_2(NH_3)Cl]$ SO_4 (20 Marks)

3 3.1 Sketch the molecular orbitals (bonding and antibonding) formed by the overlap of the following sets of atomic orbitals.

3.1.1 a $2P_x$ orbital and a $2P_x$ orbital along the x-axis.   (10 Marks)

3.1.2 a $2P_x$ orbital and a $2P_x$ orbital along the z-axis.   (10 Marks)

3.1.3 a 2s orbital and a $2P_x$ orbital along the x-axis.   (10 Marks)

3.2 Using the VSPER theory for each of following molecules and predict their shapes.

3.2.1 H_2O (10 Marks)

3.2.2 CH_4 (10 Marks)

3.2.3 PH_5 (10 Marks)

3.3 Explain the molecular geometry of H_2O and BeH_2 by using Valence bond theory.   (40 Marks)

4 4.1 Define 'Molecular orbital theory'.   (10 Marks)

4.2 For O_2, O_2^{2-}, O_2^{2+} and N_2^-.

4.2.1 Draw molecular orbital energy level diagrams.   (50 Marks)

4.2.2 Write down the molecular orbital electronic configuration of the above molecules.   (20 Marks)

4.2.3 Find out bond order of the above molecules.   (10 Marks)

4.2.4 Explain the stability of above species.   (10 Marks)

5   5.1   Write down the applications of EDTA.   **(20 Marks)**

5.2   Indicate a titrimetric method to find out the total hardness of water.   **(30 Marks)**

5.3   Using a 0.010 mol/l standard solution of EDTA, a water sample of 100 ml was titrated three times. Results of titration are given below:

Titration No.	Volume (ml) of EDTA
01	10.14
02	10.10
03	10.12

Determine the total hardness of water sample.   **(50 Marks)**

6   6.1   Define the followings

6.1.1 Titrimetry   **(10 Marks)**

6.1.2 Gravimetry   **(10 Marks)**

6.2   What conditions would fulfil the titrimetric analysis?   **(20 Marks)**

6.3   List four different types of titrimetric analysis with suitable example.   **(20 Marks)**

6.4   Define 'Limit test'.   **(10 Marks)**

6.5   Write down the limit test method to identify Cl^- and SO_4^{2-} in Pharmaceutical products.   **(30 Marks)**