UNIVERSITY OF JAFFNA, SRILANKA
BACHELOR OF PHARMACY
FIRST YEAR SECOND SEMESTER EXAMINATION – MARCH 2019
PHARMACEUTICAL CHEMISTRY I - PHACH 1273

DATE: 18.03.2019   TIME: 3 Hours.

ANSWER ALL QUESTIONS.

1.
    1.1. Briefly explain the followings:
        1.1.1. Heisenberg uncertainty principle.   (20 Marks)
        1.1.2. Rutherford's nuclear scattering experiment.   (20 Marks)
    1.2. List the properties of positive rays.   (10 Marks)
    1.3.
        1.3.1. Briefly explain the photoelectric effect   (20 Marks)
        1.3.2. A photoelectric metal surface with a threshold frequencyof
                0.75×10^{15}Hz was illuminated by a 250nm photon and emits
                electron. (h= 6.63×10^{-34}Js, mass of the electron =9.11×10^{-31}kg,
                speed of light =3×10^8ms^{-1}).
                Calculate the followings:
                1.3.2.1. Work function of that metal.   (15 Marks)
                1.3.2.2. Maximum kinetic energy of the emitted photoelectron.   (15 Marks)

2.
    2.1. Write an account on dual nature of matter.   (15 Marks)
    2.2. Briefly explain the basis for Dalton's atomic theory and the main parts of his theory.
                                                                       (20 Marks)
    2.3. Define the Valence shell electron pair repulsion (VSEPR) model.   (10 Marks)
    2.4. Draw the Lewis structure for the following molecules.
        2.4.1. Na_2S (05 marks)
        2.4.2. SO_2 (10 marks)
        2.4.3. PCl_3 (10 marks)
    2.5. Assign AXmEn designation, identify the LP-LP, LP-BP, BP-BP interactions, explain
        the deviation in bond angle from ideal bond angle and describe the molecular
        geometry based on VSEPR model for the following chemical species.
        2.5.1. ICl_4^- (15 Marks)
        2.5.2. BrF_5 (15 Marks)

3.

    3.1. Define the terms 'Atomic orbital' and 'Molecular orbital'   (10 Marks)

    3.2. For N_2^+, N_2, N_2^-, F_2 and F_2^{2-}

        3.2.1. Draw the molecular orbital energy level diagrams.   (25 Marks)

        3.2.2. Write down the molecular orbital electronic configuration of the above molecules.   (10 Marks)

        3.2.3. Calculate the bond order of the above molecules.   (10 Marks)

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

        3.2.5. Classify them according to their magnetic property.   (10 Marks)

        3.2.6. Give the reason for the difference in the order of formed molecular orbitals of N_2 and F_2 (10 Marks)

    3.3. Sketch the energy level diagram for formed molecular orbitals of hetero-nuclear diatomic molecule NO.   (15 marks)

4.

    4.1.

        4.1.1. Briefly explain the possible hybridizations of carbon in molecules by sketch the energy level diagram (Depict the ground state, excited state, hybridization state).   (30 marks)

        4.1.2. Compare the stability of hybridized orbitals of carbon based on their energy   (10 marks)

        4.1.3. Draw the structure of the hybridized orbital and give two examples for eachtype of hybridization   (15 marks)

    4.2. Define the following terms

        4.2.1. Equivalence point   (10 Marks)

        4.2.2. Gravimetric Analysis   (10 Marks)

    4.3. Briefly describe the types of titrimetric analysis.   (25 Marks)

5. Define the followings:

        5.1.1. Co-ordination number   (10 Marks)

        5.1.2. Chelation   (10Marks)

        5.1.3. Stereo isomerism   (10Marks)

    5.2. Briefly describe any five types ofstructural isomerism related to co-ordination compounds.   (30 Marks)

    5.3. Give the IUPAC name of the following compounds or ions.

        5.3.1. $[Cr(H_2O)_5ONO][FeBr_4]_2$ (10 Marks)

        5.3.2. $[Pb(NH_3)_4]F_2$ (10 Marks)

    5.4. Find out the possible isomerism/s present in the followings.

        5.4.1. $[Cr(H_2O)_5SCN]^{2+}$ (05 Marks)

        5.4.2. $[Pt(NH_3)_4(OH)_2]SO_4$ (05 Marks)

5.5. List the types of ligands and give one example for each   (10 Marks)

6.

    6.1. Define the followings:
        6.1.1. Assay.   (05 Marks)
        6.1.2. Identification test.   (05 Marks)
        6.1.3. Test for purity .   (05 Marks)
    6.2. Briefly explain limit test for chloride ions
        6.2.1   the principle.   (10 Marks)
        6.2.2   standard method.   (15 Marks)
        6.2.3   modified method.   (10 Marks)
    6.3. Briefly explain how the impurities are incorporated with the
        pharmaceutical preparations   (50 Marks)