



UNIVERSITY OF JAFFNA, SRILANKA
BACHELOR OF PHARMACY
FIRST YEAR SECOND SEMESTER EXAMINATION – February 2017
PHACH 1273 PHARMACEUTICAL CHEMISTRY I

DATE: 22.02.2017

TIME: 3 Hours.

Answer to all six questions.

1.

1.1. Write an account on the followings:

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|---|------------|
| 1.1.1. Heisenberg uncertainty principle | (25 Marks) |
| 1.1.2. Rutherford's nuclear scattering experiment | (20 Marks) |
| 1.1.3. Dual nature of matter | (20 Marks) |

1.2.

1.2.1. Define the photo electric effect. (05 Marks)

1.2.2. A photoelectric surface of a metal with work function 2.28eV is illuminated by a 300nm photon and emits electron. ($h = 6.63 \times 10^{-34} \text{Js}$, mass of the electron $= 9.11 \times 10^{-31} \text{kg}$, speed of light $= 3 \times 10^8 \text{ms}^{-1}$).

Calculate the followings:

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|--|------------|
| 1.2.2.1. Threshold frequency of the metal. | (10 Marks) |
| 1.2.2.2. Maximum kinetic energy of the emitted photoelectron. | (10 Marks) |
| 1.2.2.3. Speed of the electron at this maximum kinetic energy. | (10 Marks) |

2.

2.1. Define the followings.

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|---|------------|
| 2.1.1. Valence shell electron pair repulsion (VSEPR) model. | (10 Marks) |
| 2.1.2. Valence bond theory. | (10 Marks) |

2.2.

2.2.1. List the five basic electron domain geometry based on VSEPR model. (15 Marks)

2.2.2. Give one example for above listed each electron domain geometry and explain the hybridization of each of its central atom by using orbital diagrams. (20 Marks)

2.3. For the following species draw the Lewis structure, assign AX_mE_n 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

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|--------------------------------------|------------|
| 2.3.1. NH ₃ | (15 Marks) |
| 2.3.2. I ₃ ⁻ | (15 Marks) |
| 2.3.3. ICl ₄ ⁻ | (15 Marks) |

- 3.
- 3.1. Define the 'Molecular orbital'. (10 Marks)
- 3.2. Draw the labelled energy level diagram for formed molecular orbitals of a homonuclear diatomic molecule of period 2 which has no interaction between the 2S atomic orbital of one atom and the 2P atomic orbital of the other atom even though its 2S and 2P atomic orbitals are occupied with electrons. (20 Marks)
- 3.3. For X_2^+ , X_2 , X_2^- (X has 5 valence electrons on its outer most shell L and large 2S-2P interaction is observed in this molecule)
- 3.3.1. Draw the molecular orbital energy level diagrams. (30 Marks)
- 3.3.2. Calculate the bond order of the above molecules. (20 Marks)
- 3.3.3. Classify them according to their magnetic property. (20 Marks)
- 4.
- 4.1. Give two occurrence of the following elements.
- 4.1.1. Beryllium (10 Marks)
- 4.1.2. Potassium (10 Marks)
- 4.1.3. Magnesium (10 Marks)
- 4.1.4. Calcium (10 Marks)
- 4.2. List any five methods for preparing the oxygen. (15 Marks)
- 4.3. Define the followings:
- 4.3.1. Titrant (10 Marks)
- 4.3.2. Equivalence point (10 Marks)
- 4.3.3. End point (10 marks)
- 4.4. Briefly describe the properties of a precipitate of a slightly soluble substance that should possess in order to analyse with the use of gravimetric analysis. (15 marks)
- 5.
- 5.1. Define the followings:
- 5.1.1. Co-ordination number (10 Marks)
- 5.1.2. Chelation (10 Marks)
- 5.2. Classify the ligands and give one example for each mentioned classification. (20 Marks)
- 5.3. Give the IUPAC name of the following compounds or ions.
- 5.3.1. $[\text{Co}(\text{en})_2\text{Cl}_2]\text{NO}_3$ (05 Marks)
- 5.3.2. $[\text{Fe}(\text{CN})_6]^{3-}$ (05 Marks)
- 5.3.3. $[\text{Co}(\text{NH}_3)_6][\text{FeCl}_4]_3$ (05 Marks)
- 5.3.4. $[\text{Cu}(\text{NH}_3)_4]\text{SO}_4$ (05 Marks)
- 5.4. Define 'Isomerism' and list different types of isomerism in co-ordination compounds. (20 Marks)
- 5.5. Diagrammatically illustrate the possible isomerism of
- 5.5.1. $[\text{Co}(\text{NH}_3)_4(\text{NO}_2)(\text{SO}_4)]$ (10 Marks)
- 5.5.2. $[\text{Co}(\text{en})_2(\text{NH}_3)\text{Cl}]^{2+}$ (10 Marks)

6.

6.1. Briefly explain the Bohr model postulates.

(40 Marks)

6.2. What is Zeeman effect?

(20 Marks)

6.3. Determine whether the following molecules have polarity

6.3.1. CCl_4

(20 marks)

6.3.2. NH_3

(20 Marks)