P. P. SAVANI UNIVERSITY

First Semester of B.Sc. Examination

Feb.-2022

SSCH1010–Inorganic Chemistry

11.02.2022, Friday **Time: 12:00 p.m. to 2:30 p.m.** **Maximum Marks: 60**

Instructions:

1. **The question paper comprises of two sections.**
2. **Section I and II must be attempted in separate answer sheets.**
3. **Make suitable assumptions and draw neat figures wherever required.**
4. **Use of scientific calculator is allowed.**

Section-I (Total Marks - 30)

Q.1 **Short Questions** [10]

1.1 **Objectives** [05]

1.1a For a given value of principal quantum number the order of decreasing energy for different subshells is

A $s < p < d < f$

B $p < d < f < s$

C $d < f < p < s$

D $f < d < p < s$

1.1b The values of electronegativities_____as we move from to p to bottom in a period.

A increase

B decrease

C remain the same

D none of these

1.1c Considering the elements B, C, N, F, and Si, the correct order of their non-metallic character is

A $B > C > Si > N > F$

B $Si > C > B > N > F$

C $F > N > C > B > Si$

D $F > N > C > Si > B$

1.1d A neutral atom can accept an electron to form an anion. This process involves

A gain of energy

B no change in energy

C loss of energy

D none of these

1.1e The unit in which wave number is measured

A hertz

B sec^{-1}

C nanometer

D cm^{-1}

1.1f When an electron drops from a higher energy level to a lower energy level, then
- **A** the energy is absorbed
- **B** the energy is released
- **C** the nuclear charge increases
- **D** the nuclear charge decreases

1.1g The maximum number of electrons is the outermost orbit is
- **A** 2
- **B** 8
- **C** 18
- **D** 32

1.1h Electromagnetic radiations with minimum wavelength is
- **A** ultraviolet
- **B** X-rays
- **C** infrared
- **D** radiowaves

1.1i Balmer series in the spectrum of hydrogen atom lies in
- **A** ultraviolet region
- **B** visible region
- **C** infrared region
- **D** none of these

1.1j The atomic radii_____while going from top to bottom in a period
- **A** increase
- **B** decrease
- **C** remain same
- **D** None of these

1.2 Answer the Following: (MCQ/Short Question/Fill in the Blanks) [05]

1.2a What is covalent bond?

1.2b After filling the 2s-orbitals, an electron will enter in_____?

1.2c Define the term photon.

1.2d What is electromagnetic radiation spectrum?

1.2e As we move from left to right in periodic table the ionic radius_____(increases/decreases).

Q.2 Short Notes (Attempt any two) [06]

A The wavelength of a violet light is 400 nm. Calculate its frequency and wave number.

B Write a note on Compton effect.

C Why do elements in the same group have similar physical and chemical properties?

Q.3 Explain in detail (Attempt any two) [14]

A Explain Rutherford's atomic model. What are its limitations?

B What is the basic difference in approach between the Mendeleev's Periodic Law and the Modern Periodic Law?

C Write a note on the bohr model of the atom.

Section-II (Total Marks - 30)

Q.1 Short Questions [10]

1.1 Objectives [05]

1.1a The lattice energy is the amount of energy that

A is released when one cation combines with one anion

B is released when one mole of cations combines with one mole of anions

C is released when one mole of an ionic compound is formed from its cations and anions

D is absorbed when one mole of an ionic compound is formed from its cation and anions

1.1b Considering the elements B, Al, Mg, and K, the correct order of their metallic character is

A B > Al > Mg > K

B Al > Mg > B > K

C Mg > Al > K > B

D K > Mg > Al > B

1.1c The bond angles in a trigonal molecule are

A 90°

B 120°, 90°

C 109.5°

D 120°

1.1d The maximum number of Hydrogen bonds formed by a water molecule is

A 1

B 3

C 2

D 4

1.1e The species CO, CN^- and N_2 are

A isoelectronic

B having co-ordinate bond

C having low bond energies

D having polar bonds

1.1f According to VSEPR theory,

A the lone pairs only decide the structure of the molecule

B the bond pairs only decide the structure of the molecule

C the lone pairs and bond pairs both decide the structure of the molecule

D none of these

1.1g Out of the following, intramolecular Hydrogen bonding exists in

A water

B H_2S

C 2-nitrophenol

D 4-nitrophenol

1.1h The electrical conductivity of metals is due to

A mobile protons is the nucleus

B mobile electrons in outer vacant spaces

C mobile nucleus in the nucleus

D none of these

1.1i The polarity of a covalent bond is due to

A lesser electronegativity difference between two atoms

B greater electronegativity difference between two atoms

C lesser bond energy

D greater bond energy

1.1j Which one of the following is the most polar

A H — F

B H — Br

C H — Cl

D H — I

1.2 Answer the Following: (MCQ/Short Question/Fill in the Blanks) [05]

1.2a Define the metallic bond.

1.2b In the modern periodic table, the period indicates the value of _____

1.2c Classify the bonds in the following as ionic, polar covalent: (a) HCl (b) NaCl.

1.2d The CO_2 and CS_2 ions have_____geometry (linear/trigonal).

1.2e Define the lattice energy.

Q.2 Short Notes (Attempt any two) [06]

A What is meant by an ionic bond? What are the conditions necessary for the formation of an ionic bond?

B Define or explain the following terms:
(a) Octet rule (b) Ionic bond (c) Covalent bond (d) Co-ordinate covalent bond
(e) Polar covalent bond (f) Hydrogen bonding

C Compare the properties of ionic and covalent compounds.

Q.3 Explain in detail (Attempt any two) [14]

A Why do elements in the same group have similar physical and chemical properties?

B Explain qualitatively the valence bond theory with reference to Hydrogen molecule.

C Write a short note on Hydrogen bonding.