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B.Sc.-M. Sc. (Forensic Science) (Semester – 1st)

INORGANIC CHEMISTRY-I

Subject Code: BSNMS1103

Paper ID: [23480104]

Time: 03 Hours

Maximum Marks: 60

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A

(2 marks each)

Q1. Attempt the following:

- a) Draw the shape of orbital corresponding to $n = 3$ and $l = 2$.
- b) What is Aufbau principle? Discuss its limitations also.
- c) Out of 1s, 2s, 3d, 3f which orbitals are not possible? Explain with reasons.
- d) What do you understand by successive ionization energy?
- e) Distinguish between electron affinity and electronegativity.
- f) Give reason for higher boiling point of H_2O than H_2S .
- g) Why He_2 does not exist?
- h) A compound consisting of cation radius 0.97 \AA and anion radius 2.51 \AA will probably crystallize as NaCl form, if correct justify your answer.
- i) $CuCl$ and $AgCl$ are insoluble in water whereas $NaCl$ is highly soluble in water, why?
- j) How does solubility of ionic solid depend upon the lattice energy?

Section – B

(5 marks each)

- Q2. Write the wave equation defining the orbital, which part of the wave equation governs the shape of the orbital? Also draw the radial distribution curve for 3s and 3d orbitals.
- Q3. Define electronegativity. How it varies along group and period in periodic table.
- Q4. How Slater rules are used for calculating shielding constant for Z effective? Calculate the effective nuclear charge for 4s and 3d orbital of Cr.
- Q5. What do you understand by hybridization? Explain with one example of sp hybridization.
- Q6. Explain polarizations power and polarizability.

Section – C

(10 marks each)

- Q7. Derive Schrödinger wave equation and explain how this equation support Bohr's theory of hydrogen atom?
- Q8. With the help of molecular orbital diagram for O_2 , O_2^+ , O_2^- and O_2^{2-} . Find out the bond order and arrange the molecules in terms of increasing bond length.
- Q9. What is meant by radius ratio? How will you determine the ionic radius ratio of crystal in which the central metal ion, A^+ is surrounded octahedrally by six B^- ?