

B.Sc. Semester-II Examination, 2022-23**CHEMISTRY [Honours]**

Course ID : 21411 Course Code : SH/CHEM/201/C-3

Course Title : Inorganic Chemistry I

[NEW SYLLABUS]

Time : 1 Hour 15 Minutes

Full Marks : 25

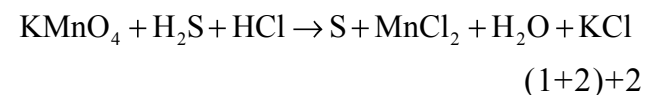
*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in their own words as far as practicable.*

1. Answer any **five** questions: 1×5=5
- What values of 'm' are taken conventionally for p_x , p_y and p_z orbitals?
 - What will be the periodic position of element having atomic number 83?
 - Arrange halogen hydracids in an expected order of increasing acidity.
 - Why chlorine has higher electron affinity than fluorine?
 - Find out the equivalent weight of $K_2Cr_2O_7$ in acid medium. [M. Wt. of $K_2Cr_2O_7 \equiv M$]

- Give an example of an inorganic dismutation reaction.
- Give the expression of electronegativity in Allred-Rochow scale.
- Why the acidity of HSO_3F increases many times in presence of SbF_5 ?

2. Answer any **two** questions: 5×2=10

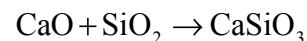
- What is Frost diagram? What is its utility?
 - Balance the following equation in ion-electron method:



- How Slater's rules explain that ns orbital is filled first than (n-1)d orbital?
 - State van der Waals radius. Why van der Waals radius is larger than covalent radius? 2+(1+2)
- The first Bohr radius of hydrogen atom is 0.529\AA ; find the same for He^+ ion.
 - Enunciate de Broglie's concept on wave-particle duality. Derive Bohr's quantum restriction from de Broglie's equation.

2+3

- d) i) How can you explain the following reaction as acid-base reaction?



- ii) With proper reasons arrange the following acids in decreasing order of acidity:



- iii) Write down the autoionisation of liquid NO_2 . 2+2+1

3. Answer any **one** question: 10×1=10

- a) i) What is exchange energy? From the concept of exchange pair of electrons justify that the ground state configuration of chromium is $3d^5 4s^1$ and not $3d^4 4s^2$.

- ii) What do you mean by inert pair effect? Give a suitable example.

- iii) Calculate the wave number of the third line in the Balmer series of Be^{3+} ion. ($R_H = 109677\text{cm}^{-1}$).

- iv) Arrange BF_3 , BCl_3 and BBr_3 in order of increasing Lewis acidity with explanation.

3+2+2+3=10

- b) i) Write down the conjugate acids and bases of the following:



- ii) The standard oxidation potentials of the electrodes $\text{Hg}/\text{Hg}_2^{2+}$ and Hg/Hg^{2+} are 0.80 and -0.85 volts respectively at 25 deg C. Find the equilibrium constant of the reaction, $\text{Hg} + \text{Hg}^{2+} \rightarrow \text{Hg}_2^{2+}$.

- iii) Draw the radial probability distribution curves for 2s and 3s electrons.

- iv) 'Aniline is a borderline base although N is a hard centre' – Comment. 2+4+2+2
