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**B—53—2019**

**FACULTY OF SCIENCE**

**B.Sc. (First Year) (Second Semester) EXAMINATION**

**MARCH/APRIL, 2019**

**(CBCS/CGPA)**

**CHEMISTRY**

**Paper IV**

**(Physical and Inorganic Chemistry)**

**(MCQ+Theory)**

**(Monday, 25-3-2019)**

**Time : 10.00 a.m. to 12.00 noon**

**Time—2 Hours**

**Maximum Marks—40**

**N.B. :— (i) Attempt All questions.**

**(ii) All questions carry equal marks.**

**(iii) Use OMR sheet for Question No. 1.**

**(iv) Calculator is allowed.**

**(v) Only one answer sheet should be used for Sections A and B.**

**(MCQ)**

**1. Select the correct answer for each of the following Multiple Choice Questions : 10**

**(i) According to Dalton's atomic theory, atoms of different elements are :**

- (A) Similar in properties (B) Different in properties**  
**(C) Identical in properties (D) None of these**

**(ii) If 'r' is the radius of first Bohr's orbit of hydrogen atom, the radius of nth Bohr's orbit is .....**

- (A)  $r.n$  (B)  $r^2.n$**   
**(C)  $r.n^2$  (D)  $r^2.n^2$**

**(iii) 'Fog' is an example of .....**

- (A) liquid dispersed in gas**  
**(B) solid dispersed in liquid**  
**(C) liquid dispersed in liquid**  
**(D) liquid dispersed in solid**

**P.T.O.**

- (iv) Which of the following is an 'emulsifier' ?  
(A) Oil (B) Water  
(C) NaCl (D) Soap
- (v) A catalyst increases the rate of chemical reaction by :  
(A) Increasing activation energy  
(B) Decreasing activation energy  
(C) Reacting with reactants  
(D) Reacting with products
- (vi) Base-catalysis is caused by .....  
(A)  $\text{OH}^-$  ions only (B) All Bronsted bases  
(C) All Bronsted acids (D) Both (A) and (B)
- (vii) The S.I. unit of coefficient of viscosity is .....  
(A)  $\text{kg.m}^2.\text{sec}$  (B)  $\text{kg.m.sec}^{-1}$   
(C)  $\text{kg.m}^{-1}.\text{sec}$  (D)  $\text{kg.m}^{-1}.\text{sec}^{-1}$
- (viii) NaCl crystal is made up of .....  
(A) NaCl molecules (B)  $\text{Na}^+$  and  $\text{Cl}^-$  ions  
(C) Na and Cl atoms (D) dimers of NaCl
- (ix) Percent ionic character of a polar covalent bond depend upon .....  
(A) Electronegativity differences of bonded atoms  
(B) Dipole moment of compounds  
(C) Both (A) and (B)  
(D) Lattice energy
- (x) Molecules with one or more lone pair of electrons possesses ..... geometry.  
(A) regular (B) irregular  
(C) both (A) and (B) (D) none of these

**(Theory)**

2. Solve any *two* of the following : 10

- (a) State the postulates of Bohr's atomic theory and give its limitations.
- (b) Define viscosity. Discuss the method of determination of viscosity by Ostwald's viscometer method.
- (c) Discuss the optical and kinetic properties of sols.
- (d) State and explain auto-catalysis with examples.

3. Solve any *two* of the following : 10
- (a) (i) State Hund's rule of maximum multiplicity.
  - (ii) Describe Rutherford' alpha scattering experiment.
  - (b) What are gels ? How are they classified ? Give their properties.
  - (c) Discuss the general characteristics of colloids.
  - (d) (i) Calculate the energy of an electron in second Bohr's orbit of H-atom.
  - (ii) In the determination of surface tension of a liquid by stalagmometer method, it gives 80 drops, while water gives 40 drops for the same volume. The densities of liquid and water are 0.860 and 0.998 g cm<sup>-3</sup> respectively. If the surface tension of water is 72 dyne cm<sup>-1</sup>, find the surface tension of liquid.

### Section B

#### (Inorganic Chemistry)

4. Solve any *two* of the following : 10
- (a) Discuss Born-Haber cycle with an example.
  - (b) What is hydrogen bonding ? Explain its types with examples.
  - (c) (i) Define polarizing power and polarisability.
  - (ii) Draw molecular orbital diagram of H<sub>2</sub> molecule and calculate its bond order.
  - (d) Explain the type of hybridization and geometry involved in PCl<sub>5</sub> molecule.