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**AO—43—2018**

**FACULTY OF SCIENCE**

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

**MARCH/APRIL, 2018**

**(CBCS/CGPA Pattern)**

**CHEMISTRY**

**Paper-IV**

**(Physical and Inorganic Chemistry)**

**(MCQ+Theory)**

**(Thursday, 22-3-2018)**

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

**Time—Two 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 Section A and B.**

**MCQ**

**10**

1. Select the *correct* answer for each of the following multiple choice questions.

(i) In Bohr's atomic theory, the angular momentum of electron in fourth orbit is given as :

(a)  $\frac{h}{4\pi}$

(b)  $\frac{4h}{\pi}$

(c)  $\frac{2h}{\pi}$

(d)  $\frac{h}{2\pi}$

**P.T.O.**

- (ii) “The electrons in various orbitals are arranged according to their increasing order of energy” is a statement of :
- (a) Hund’s rule (b) Aufbau principle  
(c) Pauli’s exclusion principle (d) None of these
- (iii) With rise in temperature the surface tension of liquid :
- (a) decreases (b) increases  
(c) remains the same (d) none of these
- (iv) ‘The precipitation power of an ion increases with increase in valency of an ion’, this rule is known as :
- (a) Brownian rule (b) Hardy-Schulze rule  
(c) Gold number rule (d) None of these
- (v) Which of the following is *not* a colloidal system ?
- (a) Butter (b) Smoke  
(c) Paint (d) Sodium chloride solution
- (vi) Oxidation of sulphur dioxide to sulphur trioxide with nitric oxide as a catalyst, is an example of :
- (a) Homogeneous catalysis (b) Heterogenous catalysis  
(c) Enzyme catalysis (d) All of these
- (vii) In the synthesis of ammonia by ‘Haber’s process; the substance which acts as a catalytic ‘poison’ is :
- (a) Iron (b) Platinum  
(c) H<sub>2</sub>S (d) Al<sub>2</sub>O<sub>3</sub>

- (viii) Which of the following statements is *not* correct ?
- (a) Double bond is shorter than single bond
  - (b) Double bond is stronger than single bond
  - (c) Sigma bond is weaker than pi bond
  - (d) Covalent bond is stronger than hydrogen bond
- (ix) Fajan's rule depends on :
- (a) Charges of cation
  - (b) Charges of anion
  - (c) Electronic configuration
  - (d) All of these
- (x) The correct structure of  $IF_7$  is .....
- (a) Octahedral
  - (b) Pentagonal bipyramidal
  - (c) Square pyramidal
  - (d) Trigonal bipyramidal

### Theory

#### Section A

#### (Physical Chemistry)

2. Solve any *two* of the following :
- (a) Explain Pauli's exclusion principle. Give any *two* limitations of Bohr's theory.
  - (b) Define parachor. Give the relationship between parachor and surface tension.
  - (c) Discuss the general applications of colloids.
  - (d) State and explain Autocatalysis with examples.

P.T.O.

3. Solve any *two* of the following :

- (a) Derive an expression for the radius of  $n$ th Bohr's orbit of H-atom.
- (b) What are gels ? How are they classified ? Give their properties.
- (c) Explain enzyme catalysis with examples.
- (d) (i) Calculate the energy of an electron in first Bohr's orbit of H-atom.  
(ii) At 20°C, pure water required 104 sec. to flow the capillary of an Ostwald's viscometer, while toluene required 70 sec. Calculate the viscosity of toluene. If the viscosity of water is 1.008 centipoise and densities of water and toluene are 0.99 and 0.86 g/cm<sup>3</sup> respectively.

### Section B

#### (Inorganic Chemistry)

4. Solve any *two* of the following :

- (a) Explain valence bond theory for the formation of covalent bond.
- (b) Define hydrogen bonding. Explain different types of hydrogen bonding with example.
- (c) (i) Write a note on Born-Haber cycle.  
(ii) Draw molecular orbital diagram of oxygen molecule and calculate its bond order.
- (d) Give the postulates of VSEPR theory.