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BF—46—2016

FACULTY OF SCIENCE

B.Sc. (Second Semester) EXAMINATION

OCTOBER/NOVEMBER, 2016

CHEMISTRY

Paper IV

(Physical and Inorganic Chemistry)

(MCQ & Theory)

(Saturday, 15-10-2016)   **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 separate answer sheet (OMR sheet) for Question No. **1**.

(*iv*) Use of calculator or logarithmic table is allowed.

(MCQ)

1.   Select the *correct* answer for each of the following multiple choice questions :   10

(*i*)   Paschen series in hydrogen spectra lies in :

(*a*)   Ultra-violet region   (*b*)   Visible region

(*c*)   Infra-red region   (*d*)   All of these

(*ii*)   "The electrons in various orbitals are arranged according to increasing order of energy" is statement of :

(*a*)   Hund's rule

(*b*)   Aufbau principle

(*c*)   Pauli's exclusion principle

(*d*)   None of the above

P.T.O.

(*iii*) The Parachor is :

 (*a*) An additive property

 (*b*) A constitutive property

 (*c*) Both additive and constitutive property

 (*d*) None of the above

(*iv*) 'Fog' is an example of colloidal system of :

 (*a*) Liquid dispersed in liquid

 (*b*) Solid dispersed in solid

 (*c*) Gas dispersed in a liquid

 (*d*) Liquid dispersed in gas

(*v*) 'The precipitation power of an ion increases with increase in valency of ion', this rule is known as :

 (*a*) Brownian rule (*b*) Hardy-Schulze rule

 (*c*) Gold number rule (*d*) None of these

(*vi*) When one of the product of reaction itself acts as catalyst for that reaction, is called as :

 (*a*) homogeneous catalysis (*b*) promotors

 (*c*) auto-catalysis (*d*) enzyme catalysis

(*vii*) An example of Acid-Base catalysis is :

 (*a*) Inversion of cane sugar

 (*b*) Keto-enol tautomerism

 (*c*) Decomposition of nitramide

 (*d*) All of the above

(*viii*) Which of the following combinations gives the most ionic compound ?

 (*a*) Na and H (*b*) Mg and O

 (*c*) Br and F (*d*) Cs and F

(*ix*) The hydrogen bond is the strongest in :

 (*a*) O—H .... S (*b*) S—H .... O

 (*c*) F—H .... F (*d*) F—H .... O

(*x*) Bond order of Ne$_2$ is :

(*a*) 0 (*b*) 1

(*c*) 2 (*d*) 3

(Theory)

Section A

(Physical Chemistry)

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

(*a*) Explain Homogeneous and Heterogeneous Catalysis with examples.

(*b*) Define surface tension. How will you determine the surface tension of liquid by drop-number method ?

(*c*) Explain :

(*i*) Aufbau principle

(*ii*) Hund's rule.

(*d*) Give the general applications of colloids.

3. Answer any *two* of the following : 10

(*a*) What are gels ? How are they classified ? Give their properties.

(*b*) Derive an expression for energy of an electron in *n*th Bohr's orbit of H-atom.

(*c*) Explain catalytic poisoning with examples.

(*d*) (*i*) Calculate the radius of second Bohr's orbit of H-atom.

(*ii*) In an experiment with Ostwald's viscometer, the times of flow of water and ethanol are 85 sec. and 185 sec. at 20°C. The densities of water and ethanol are 0.997 g/cm^3 and 0.799 g/cm^3. If the viscosity of water is 0.01008 poise, calculate viscosity of ethanol.

Section B

(Inorganic Chemistry)

4. Answer any *two* of the following : 10

(*a*) How will you determine lattice energy using Born-Haber cycle ?

(b) Define hydrogen bonding. Explain different types of hydrogen bonding.

(c) (i) Calculate the percentage of ionic character in CsF molecule using Hannay Smith equation.

Given :

Electronegativity of F = 4.0 and

Cs = 0.7.

(ii) Explain sp^3d hybridisation with suitable example.

(d) What is LCAO approximation ? Explain bonding and antibonding molecular orbit.