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R—44—2017

FACULTY OF SCIENCE

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

MARCH/APRIL, 2017

(CBCS/CGPA Pattern)

CHEMISTRY

Paper IV

(Physical and Inorganic Chemistry)

(Wednesday, 29-3-2017) **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 :

(1) The energy of an electron in first Bohr's orbit of H-atom is ..... .

(*a*) –13.6 eV

(*b*) –1312 kJ mol^{-1}

(*c*) -2.179×10^{-11} erg/atom

(*d*) All of the above

(2) The maximum number of electrons in a subshell is given as :

(*a*) n^2 (*b*) $2n^2$

(*c*) $2(2l + 1)$ (*d*) $(2l - 1)$

P.T.O.

(3) In general, as temperature increases, the viscosity of liquid ..... .

(*a*) increases (*b*) decreases

(*c*) remains the same (*d*) None of these

(4) 'Butter' is an example of :

(*a*) Sol (*b*) Gel

(*c*) Emulsion (*d*) Foam

(5) Many inorganic gels on standing undergoes shrinkage, this phenomenon is known as :

(*a*) Syneresis (*b*) Thixotropy

(*c*) Swelling (*d*) Hydration

(6) All example of Acid-Base catalysis is :

(*a*) Inversion of cane-sugar

(*b*) Keto-enol tautomerism

(*c*) Decomposition of nitramide

(*d*) All of the above

(7) Oxidation of ammonia to nitric oxide in the presence of platinum gauze, is an example of :

(*a*) Homogeneous catalysis (*b*) Heterogeneous catalysis

(*c*) Enzyme catalysis (*d*) All of these

(8) Hydrogen bonding is absent in ..... .

(*a*) CH_3COOH (*b*) CH_4

(*c*) C_2H_5OH (*d*) H_2O

(9) The ability of cation to polarise anion is called ..... .

(*a*) Polarising power (*b*) Polarisability

(*c*) Both (*a*) and (*b*) (*d*) None of these

(10) The minimum bond angle is present in ..... .

(*a*) NH_3 (*b*) CH_4

(*c*) H_2O (*d*) All of these

Theory

Section A : (Physical Chemistry)

2. Solve any *two* of the following :

(*i*) State the postulates of Bohr's atomic theory.

(*ii*) Define Surface Tension. Discuss the method of determination of surface tension by drop-number method.

(*iii*) Explain :

(*a*) Tyndall effect

(*b*) Brownian movement.

(*iv*) Discuss the characteristics of catalytic reactions.

3. Solve any *two* of the following :

(*i*) Explain :

(*a*) Rutherford's atomic model

(*b*) Aufbau principle.

(*ii*) Discuss the general applications of colloids.

(*iii*) Write notes on :

(*a*) Catalytic poisoning

(*b*) Promoters.

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

(*b*) In an experiment of Ostwald's viscometer, the time of flow of water and benzene are 70 and 48 sec. at 20°C. The densities of water and benzene are 0.99 and 0.80 g/cm^3. The viscosity of water is 1.008 centipoise. Calculate the viscosity of benzene.

P.T.O.

Section B : (Inorganic Chemistry)

4. Solve any *two* of the following :

(*i*) Define metallic bond. Explain free electron theory of metallic bond.

(*ii*) Define polarising power and polarisability of ion. Explain fajans rules.

(*iii*) (*a*) Give the limitations of valence bond theory of covalent bond.

(*b*) Draw molecular orbital diagram of nitrogen molecule and calculate its bond order.

(*iv*) Epxlain the SP^3d^3 type of hybridization with suitable example.