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B—58—2019

FACULTY OF SCIENCE

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

MARCH/APRIL, 2019

(CBCS/CGPA Pattern)

CHEMISTRY

Paper IX (CCC-IV)

(Physical and Inorganic Chemistry)

(MCQ + Theory)

(Monday, 25-3-2019)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—40

- N.B. :—*
- (i) Attempt *All* questions.
 - (ii) *All* questions carry equal marks.
 - (iii) Use of logarithmic table and calculator is allowed.
 - (iv) Use separate answer sheet for MCQ No. 1.
 - (v) Use black point pen to darken the circle of correct choice in OMR sheet.
 - (vi) Use only one answer-book for both Sections A and B.

MCQ

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

- (1) For a reaction involving reactants P, Q and R, which of the following rate has an overall order 2.5 :
- (A) Rate = $K[P]^{0.5} [Q]^{0.5} [R]^{0.5}$
 - (B) Rate = $K[P]^{1.5} [Q]^1 [R]^0$
 - (C) Rate = $K[P]^1 [Q]^1 [R]^1$
 - (D) Rate = $K[P]^{0.5} [Q]^1 [R]^{1.5}$

P.T.O.

- (2) Theory of ionisation of electrolytes was proposed by :
- (A) Rutherford (B) Lewis
(C) Arrhenius (D) Ostwald
- (3) In a photochemical reaction 100 molecules are reacted to give products by the absorption of 10 photons of suitable radiation. The quantum yield of such a reaction is :
- (A) 1000 (B) 100
(C) 1100 (D) 10
- (4) As the temperature of a reaction is increased, the rate of the reaction increases because :
- (A) The reactant molecules collide less frequently
(B) The reactant molecules collide with greater energy
(C) The activation energy is lowered
(D) The reactant molecules collide less frequently and with greater energy
- (5) Which of the following is a weak electrolyte ?
- (A) CH_3COOH (B) NaCl
(C) HCl (D) K_2SO_4
- (6) The glow of fireflies is due to the aerial oxidation of luciferin which is an example of :
- (A) Phosphorescence (B) Chemiluminescence
(C) Fluorescence (D) None of these
- (7) If t_a and t_c are the transport numbers of anion and cation respectively, then the transport number of anion is given by :
- (A) $t_a = 1 - t_c$ (B) $t_a = 1 + t_c$
(C) $t_a = 2 + t_c$ (D) $t_a = 2 - t_c$
- (8) The type of hybridisation present in XY_3 type of Interhalogen is :
- (A) sp^2 (B) sp^3d
(C) sp^3d^2 (D) sp^3d^3

- (9) The structure of ICl_4^- is :
- (A) Square planar (B) Linear
(C) Tetrahedral (D) Octahedral
- (10) Ultramarine has :
- (A) Red colour (B) Green colour
(C) Splendid blue colour (D) Black colour

Theory

Section A

(Physical Chemistry)

2. Solve any *two* of the following : 2×5=10
- (i) Explain the collision theory of reaction rates.
- (ii) (a) The resistance of N/50 solution of a salt is found to be 1.5×10^3 ohms. Calculate the specific conductance of the solution if the cell constant is 1.1 cm^{-1} . 3
- (b) Explain the conductometric titration of a strong acid *vs.* a strong base. 2
- (iii) Derive the equation for rate constant of second order reaction when $a = b$. Mention its any *two* characteristics.
- (iv) Explain the phenomenon of fluorescence and phosphorescence with the help of Jablonski diagram.
3. Solve any *two* of the following : 2×5=10
- (i) Explain the Debye-Huckel theory of strong electrolytes.
- (ii) What is quantum field ? Give the reasons for low and high quantum fields.
- (iii) State the Kohlrausch law. Explain its any *two* applications.
- (iv) (a) Explain the variation of temperature and dilution on specific conductance. 2
- (b) For a first order reaction, the half life period is 40 minutes. What is the time taken for 60% of the completion of the reaction. 3

P.T.O.

Section B**(Inorganic Chemistry)**

4. Answer any *two* of the following :
- (a) What are Carbides ? Give their classification.
 - (b) What are Interhalogen Compounds ? Give the preparation and structure of BrF_5 .
 - (c) Explain the structure of Cl_2O_7 .
 - (d)
 - (i) Write a short note on Fullerene.
 - (ii) Explain strength and stability of oxyacids of halogens.