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R—48—2017

FACULTY OF SCIENCE

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

MARCH/APRIL, 2017

CHEMISTRY

Paper IX

(Physical and Inorganic Chemistry)

(Wednesday, 29-3-2017)   **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 (OMR Sheet) for MCQ No. **1**.

     (*v*)   Use black point pen to darken the circle of correct choice in OMR answer 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)   The unit of rate constant for second order reaction is :

     (*a*)   Mole lit^{-1} time^{-1} (*b*) Mole^{-1} lit^{-2} time^{-1}

     (*c*) Mol^{-1} lit time^{-1} (*d*) Mol^{-2} lit^{2} time^{-1}

P.T.O.

(2) For certain reaction rate expression takes the form rate $= K[A]^{\frac{5}{2}} \cdot [B]^{\frac{1}{2}}$.

The order of reaction is :

(a) 3

(b) $\dfrac{5}{2}$

(c) $\dfrac{3}{2}$

(d) 4

(3) Cell constant is equal to :

(a) $\dfrac{\text{length of conductor}}{\text{cross sectional area of conductor}}$

(b) $\dfrac{\text{specific conductance}}{\text{observed conductance}}$

(c) Specific conductance × Resistance

(d) All of the above

(4) With increase in dilution of electrolytic solution :

(a) Specific conductance decreases and equivalent conductance increases

(b) Specific conductance increases and equivalent conductance increases

(c) Specific conductance decreases and equivalent conductance decreases

(d) Specific conductance increases and equivalent conductance decreases

(5) The transport number of an anion is given by expression, if V represents speed of an ion :

(a) $t_a = \dfrac{V_c}{V_a - V_c}$

(b) $t_a = \dfrac{V_a}{V_a - V_c}$

(c) $t_a = \dfrac{V_a}{V_a + V_c}$

(d) $t_a = \dfrac{V_c}{V_a + V_c}$

(6) If Stark Einstein's law is strictly obeyed by the reactant molecules, then the quantum yield of photochemical reaction is :

(a) greater than one   (b) equal to one

(c) less than one   (d) equal to zero

(7) "Only those light radiations which are absorbed by the reactant molecules which are effective in producing chemical reaction." This is the statement of :

(a) Stark-Einstein's law of photochemical equivalence

(b) Grothus Draper's law

(c) Lambert-Beer's law

(d) Hittorf's law

(8) The basic unit of beryl is ....

(a) $Si_2O_7^{-6}$ (b) $Si_3O_9^{-6}$

(c) $Si_6O_{18}^{-12}$ (d) None of these

(9) Which of the following does *not* form oxy acids of halogen ?

(a) Fluorine   (b) Chlorine

(c) Bromine   (d) Iodine

(10) Hybridisation of Interhalogen compound IF_7 is ....

(a) dsp^2 (b) dsp^3

(c) d^2sp^3 (d) sp^3d^3

Theory

Section A

(Physical Chemistry)

2. Solve any *two* of the following :   2×5=10

(i) Derive the equation for rate constant of first order reaction. State its any *two* characteristics.

P.T.O.

(ii)   (a)   Define terms specific conductance and equivalent conductance. 2

      (b)   Write a note on Relaxation effect.   3

(iii)   Draw well labelled Joblanski diagram to explain photophysical pathways. Explain phosphorescence briefly.

(iv)   A solution of H_2O_2 when titrated against $KMnO_4$ solution at different time intervals gave the following results.

Time (min)	Vol. of $KMnO_4$ used for 10 ml H_4SO_4
0	23.8 ml
10	14.7 ml
20	9.1 ml

Show that the decomposition of H_2O_2 is a first order reaction.

3.   Solve any *two* of the following :   2×5=10

(i)   (a)   What is second order reaction ? Show that for second order reaction $t_{1/2}$ is inversely proportional to initial concentration of reactant.   3

      (b)   In a photochemical reaction 5×10^{20} molecules were decomposed by absorbing 0.5×10^{19} quantas of radiation. Calculate quantum yield of photochemical reaction.   2

(ii)   State Kohlrausch law of migration of independent ions. Explain its any *two* applications.

(iii)   The resistance of N/20 solution of NaCl was found to be 400 ohms. Calculate equivalent conductance of NaCl solution when two platinum electrodes dipping in it are 1.5 cm apart having cross-sectional area 3.0 cm^2.

(iv)   State Stark-Einstein's law of photochemical equivalence. Give reasons for low and high quantum yield of photochemical reactions.

Section B

(Inorganic Chemistry)

4. Answer any *two* of the following : 2×5=10

   (*i*) What are Zeolites ? Gives their classification.

   (*ii*) Give preparation, properties and uses of cyanogen.

   (*iii*) What are oxy acids of halogen ? Explain the strength and stability of oxy acids of halogen.

   (*iv*) Give the preparation, structure and uses of dichlorine heptoxide (Cl_2O_7).