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SHIVAJI UNIVERSITY, KOLHAPUR

DATTAJIRAO KADAM ARTS, SCIENCE AND COMMERCE COLLEGE, ICHALKARANJI

B.Sc. (Part – II) (Semester – III) (New) (CBCS)

Examination October, 2023

CHEMISTRY (Paper - V)

DSC– C3: Physical Chemistry

Sub. Code: 73302

Day and Date: Wednesday, 08-11-2023 **Total Marks: 50**

Time: 02.30 p.m. to 04.30 p.m.

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat diagrams and give equations wherever necessary.
4) Use of Scientific calculator and logarithmic table is allowed.

Q 1 A) Answer the following in one sentence. **[05]**

a) What do you mean by energy of activation?

b) Define colligative properties.

c) Give Geiger-Nuttal relation for decay constant.

d) What are different types of adsorption?

e) Give mathematical expression of Kohlrausch's law?

B) Choose the most correct alternative for each of the following and rewrite the sentences. **[05]**

a) The shape of liquid droplets is spherical due to---------.

i) surface tension ii) viscosity

iii) parachor iv) refractive index

b) Conductance is the reciprocal of ----------.

i) conductivity ii) resistance

iii) specific resistance iv) none of these

c) Freundlich adsorption isotherm is represented as---------.

i) $a = Kp^{1/n}$ ii) $a = KC^{1/n}$

iii) both i) and ii) iv) none of these

d) Generally α-particles from same source are of ----------energy.

i) different ii) same

iii) unequal iv) varied

e) Half life of third order reaction, $t_{1/2}$ = ------- --.

i) k/0.693 ii) 0.693/k

iii) $3/2ka^2$ iv) $2ka^2/3$

Q 2) Attempt any TWO of the following. **[20]**

a) Mention different types of nuclear radiations. Give the properties of all types of radiations.

b) What are conductometric titrations? Discuss conductometric titration of i) strong acid Vs strong base ii) strong acid Vs weak base.

c) What are third order reactions? Mention any two examples of third order reactions. Derive kinetic equation of third order reaction. $3A \rightarrow$ Products

d) Describe the principle, construction and working of Abbe's refractometer.

Q 3) Answer any four of the following. **[20]**

a) Explain the factors affecting adsorption.

b) Distinguish between electronic (metallic) and electrolytic conductors.

c) What is transport number? Discuss any two factors affecting transport number of ions.

d) Absolute velocities of Na^+ and NO_3^- ions at 293K are 5.2×10^{-4} $m.sec^{-1}$ and 7.4×10^{-4} $m.sec^{-1}$ respectively. Calculate transport numbers of Na^+ and NO_3^- ions.

e) Explain in detail scintillation counter method for detection and measurement of nuclear radiation.

f) Explain how viscosity is determined by using Ostwald's viscometer?

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SHIVAJI UNIVERSITY, KOLHAPUR

DATTAJIRAO KADAM ARTS, SCIENCE AND COMMERCE COLLEGE, ICHALKARANJI

B.Sc. (Part – II) (Semester – III) (New) (NEP)

Examination October, 2023

CHEMISTRY (Paper - V)

DSC– C3: Physical Chemistry

Sub. Code: 91567

Day and Date: Wednesday, 08-11-2023 **Total Marks: 40**

Time: 02.30 p.m. to 04.30 p.m.

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat diagrams and give equations wherever necessary.
4) Use of Scientific calculator and logarithmic table is allowed.

Q 1 A) Choose the most correct alternative and rewrite the sentences again. [08]

a) The rate constant K and temperature are related by ---------- equation.

i) Vant's Hoff ii) Arrhenius

iii) BET iv) Avogadro's

b) Conductance is the reciprocal of -------- --.

i) conductivity ii) resistance

iii) specific resistance iv) none of these

c) The Langmuir isotherm considers only ----------layer of the adsorbate molecules.

i) unimolecular ii) bimolecular

iii) both i) and ii) iv) none of these

d) Liquid crystal state is also called as ----------state.

i) Crystalline ii) mesomorphic

iii) liquid iv) hybrid

e) Half life of third order reaction, $t1/2$ = ------- --.

i) k/0.693 ii) 0.693/k

iii) $3/2ka^2$ iv) $2ka^2/3$

f) One Faraday is equal to----------Coulomb.

i)96.5 ii) 96500

iii)9.65 iv) 9650

g) The process carried out at constant volume is called ---------- process.

i) isothermal ii) isobaric

iii) isotonic iv) isochoric

h) Entropy is --------- function.

i) state ii) pure

iii) impure iv) none of these

Q 2) Attempt any TWO of the following. **[16]**

a) What is meant by Adsorption Isotherm ? Explain Freundlich adsorption isotherm with all terms involved in it. Give graphical representation and limitations.

b) What are conductometric titrations? Discuss conductometric titration of i) strong acid Vs strong base ii) strong acid Vs weak base.

c) Write postulates of kinetic theory of gases. Distinguish between ideal and non-ideal gases.

Q 3) Answer any FOUR of the following. **[16]**

a) Distinguish between physical and chemical adsorption.

b) Distinguish between electronic (metallic) and electrolytic conductors.

c) What is transport number? Discuss factors affecting transport number of ions.

d) What is the change of entropy when 105 KJ of heat is transferred to large mass of water at $0^{o}C$?

e) State Kohlrausch's law. How is it used to determine equivalent or molar conductance at infinite dilution of weak electrolyte.

f) Derive the kinetic equation for third order reaction. $3A \rightarrow$ Products