SARDAR PATEL UNIVERSITY

M.Sc. – Chemistry (First Semester) (CBCS)

Topics in Physical Chemistry- I

Course Code: PS01CCHE23

Saturday, 27th October, 2018

Time: 10:00 A.M. to 01:00 P.M.   Total Marks: 70

Que.1   Select correct answer of the followings   **(08)**

1   Identify ideal solution

A) benzene + toluene   B) $CCl_4 + SiCl_4$

C) chlorobenzene + bromobenzene   D) all

2   Identify incorrect statement

A) The partial vapour of the two components are linear function of their respective mole fractions

B) Ethanol + Water system is an example of ideal solution

C) Henry's law is applicable to solute then solvent must obey Rault's law.

D) For solution exhibiting positive deviation from ideal behavior heat must be absorbed.

3   The rate of a first order reaction is 1.5×10^{-2} mol L^{-1} min^{-1} and the initial concentration is 0.5 mol L^{-1}. The half life period is

A) 7.53 minutes   B) 0.383 minutes   C) 23.1 minutes   D) 8.73 minutes

4   The activity a_i of a solution is related to

A) chemical potential   B) free energy

C) A and B both   D) none of these

5   Which of the following surfactant is a pH sensitive surfactant?

A) Cationic   B) Anionic   C) Zwitter ionic   D) Non ionic

6   Find out correct statement

A) Equation of state method give correct fugacity value

B) At high temperature and low pressure gas behaves ideally

C) Fugacity is a linear function of pressure for non ideal gases

D) For real gas PV = nRT

7   Low concentration of surfactants

A) Destroyed micelle   B) increases surface tension

C) Particles remain in its colloidal state   D) All of these

8   What is the energy of activation of a reaction if its rate doubles when the temperature is raised from 290 K to 300 K?

A) 12 k cal   B) 41 k cal   C) 13.8 k cal   D) 52 k cal

Que.2   Attempt any SEVEN of the following   (14)

1   Write difference between molecularity and order of reaction.

2   Write thermodynamics significance of partial molar properties.

3   Derive an expression for relative fugacity using first law of thermodynamics.

4   Write differential rate law for third order reaction and derive units of rate constant for the third order reaction?

5   Enlist factors affecting rate of reactions?

6   Determine charge density on the electrode.

7   Determine the electrical capacitance of the interface.

8   State the Kelvin equation. What is its importance?

9   Why mercury does not wet the glass surface? Explain?

Que.3 A Derive an expression for equation of state method for determination of fugacity.   (06)

B Determine activity of solvent from osmotic pressure measurements.   (06)

OR

B What are the basic differences between ideal and non-ideal solutions? Discuss about the solutions exhibiting positive as well as negative deviations for ideal behavior?   (06)

Que.4 A What is integrated rate law? Derive rate constant expression for first order reaction using integrated rate law.   (06)

B For a first order reaction at 300 ^{0}C, activation energy is 35 kcal mol^{-1} and the frequency constant 1.45×10^{11} sec^{-1}. Calculate the rate constant.   (06)

OR

B The time for 50% completion of certain second order reaction is 150 min. When the initial concentration is 0.08 M. Calculate the rate constant of the reaction. How much time will it take to consume 60% reactant?   (06)

2

Que.5 **A** Derive the fundamental equation for thermodynamics of electrified interface. **(06)**

B Discuss in detail over voltage and factors affecting the over voltage. **(06)**

OR

B Derive Tafel's equation for cathodic and anodic polarization and also draw **(06)** Tafel's plot.

Que.6 **A** Derive the Laplace-Young equation for the spherical surface. **(06)**

B What are surfactants? Distinguish cationic, anionic and non ionic surfactants **(06)** and write also their examples and applications?

OR

B Discuss in detail factors affecting the Critical Micelle Concentration. **(06)**

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