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Unit 9 - Week 8

Course outline

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- Lecture 36 : Molecular motion in Liquids (Contd.)
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- Lecture 38 : Molecular motion in gases
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- Lecture 40: Molecule motion in gases
- Lecture material for Week 8

Assignment 8

The due date for submitting this assignment has passed. Due on 2018-10-03, 23:59 IST.
As per our records you have not submitted this assignment.

1) *1 point*

The transport of particles arising from the motion of streaming fluid is known as-
a) Diffusion
b) Convection
c) Conduction
d) Mass transfer

- a
- b
- c
- d

No, the answer is incorrect.
Score: 0

Accepted Answers:
b

2) *1 point*

What is the approximation made (or general limits put) in deriving the expression of Fick's first Law of Diffusion in one dimension $J = -D(dc/dx)$
a) It strictly applies only to ideal solutions
b) It strictly applies only to real solutions hence, the expression is written in terms concentrations rather than activities
c) It strictly applies only to very dilute solutions hence, the expression should be written in tern of activities rather than concentrations
d) It strictly applies only to very concentrated solutions

- a
- b
- c
- d

Interactive Session with Students

If the transport of solute molecules through a solvent medium occurs ONLY due to convection effects then the Convective *flux* of particles (J) having a molar concentration of c, passir through an window of area, A, in an interval, Δt, and the fluid is flowing at a velocity, v, will b given as ___

a) $J = c/v$
b) $J = 1/cv$
c) $J = 2cv$
d) $J = cv$

- a
- b
- c
- d

No, the answer is incorrect.
Score: 0

Accepted Answers:
d

4) 1 point

The particle flux, J, is proportional to the drift speed, which is proportional to the thermodynamic force, F. The thermodynamic driving force for the motion of particles, F, will b proportional to_____.

a) $F \propto \frac{dc}{dx}$
b) $F \propto \frac{1}{dc/dx}$
c) $F \propto -\frac{dc}{dx}$
d) $F \propto -\frac{1}{dc/dx}$

- a
- b
- c
- d

No, the answer is incorrect.
Score: 0

Accepted Answers:
c

5) 1 point

Ionic mobility of small ions, in aqueous solutions at 25 °C and 1 atm, usually lies in the range 40 to 80 $\times 10^{-5}$ cm^2 $V^{-1}s^{-1}$ however, H^+ ions under similar conditions show abnormally hi motilities. This is because of:

a) Extremely small size of the H^+ ions
b) Rapid reorientation of bonds in a group of water molecules
c) Negligible mass of the H^+ ions
d) Small hydrodynamic radius of H^+ ions

- a
- b
- c
- d

No, the answer is incorrect.
Score: 0

Accepted Answers:
b

6) **1 point**

A link between diffusion coefficient, D, of ions and the ionic conductivities, λ, is provided by the _____.

a) Nernst-Einstein Relation
b) Stokes-Einstein Relation
c) Einstein Relation
d) Nernst Relation

- a
- b
- c
- d

No, the answer is incorrect.
Score: 0

Accepted Answers:
a

7) **1 point**

What is the implication when the total rate of change of the concentration of a solute, c, in a region, x, of the solvent medium is given by the following differential equation:

$$\frac{\partial c}{\partial t} = \left[D\left(\frac{\partial^2 c}{\partial x^2}\right)\right] - v\left(\frac{\partial c}{\partial x}\right)$$

a) The transport of solute molecules through a solvent medium occurs only due to the concentration gradient
b) The transport of solute molecules occurs only due to their motion through a streaming solvent medium
c) The transport of solute molecules occurs due to both diffusion and convection effects.
d) The transport of solute molecules through a solvent medium occurs only due to convectic effects.

- a
- b
- c
- d

No, the answer is incorrect.
Score: 0

Accepted Answers:
c

8) **1 point**

According to Debye-Falkenhagen Effect, at high frequencies both the asymmetry and electrophoretic effects are absent as the ionic atmosphere itself disappears. As a consequence, th molar conductivity of electrolytes _____.

a) Increases
b) Decreases
c) Remains same
d) Becomes unpredictable

- a
- b

c

d

No, the answer is incorrect.
Score: 0

Accepted Answers:
a

9) *1 point*

An important feature of which relation, obtained from extending the concept of motion of charged ions in electrolyte solution, may be applied for viscosity measurements and also t estimate the diffusion coefficients for electrically neutral molecules in solution.
a) Stokes-Einstein equation
b) Fick's first law of diffusion
c) Einstein Equation
d) Nernst-Einstein equation

a

b

c

d

No, the answer is incorrect.
Score: 0

Accepted Answers:
a

10) *1 point*

Find the diffusion coefficient of an ion in water at 25 °C that has a typical value ionic mobility value of $5 \times 10^{-8}\ m^2\ s^{-1}\ V^{-1}$
a) $1 \times 10^{-9}\ m^2 s^{-1}$
b) $2 \times 10^{-9}\ m^2 s^{-1}$
c) $5 \times 10^{-9}\ m^2 s^{-1}$
d) $1 \times 10^{9}\ m^2 s^{-1}$

a

b

c

d

No, the answer is incorrect.
Score: 0

Accepted Answers:
a

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