



Q1: Choose the correct answer/s (put circle) for the following: (60 Mark)

- For an ideal gas is: a) $(\frac{\partial U}{\partial T})_P = 0$ b) $(\frac{\partial U}{\partial V})_T = 0$ c) $(\frac{\partial H}{\partial P})_T = 0$
- The work function (A) define by thermodynamic equation:
a) $A = U + PV$ b) $A = H - PV$ c) $A = U - TS$
- For monatomic gases, the constant volume heat capacity (C_V) equal to:
a) $\frac{1}{2}R$ b) $1R$ c) $\frac{3}{2}R$
- In the reaction ($A + B \leftrightarrow C$) at equilibrium state is: a) $\Delta G^0 = 0$ b) $\Delta G = 0$ c) $\Delta G^0 = -RT \ln K$
- According to quantum mechanics, the linear momentum of photon (P) is given by the equation: a) $P = E / \lambda$ b) $P = h \cdot \lambda$ c) $P = h / \lambda$
- General unit of rate constant in the chemical reaction is:
a) $\text{mol}^n \cdot \text{L}^{-n} \cdot \text{time}^{-1}$ b) $\text{mol}^{n-1} \cdot \text{L}^{1-n} \cdot \text{time}^{-1}$ c) $\text{mol}^{1-n} \cdot \text{L}^{n-1} \cdot \text{time}^{-1}$
- The kinetic equation for the second order reaction ($A \rightarrow B$) is:
a) $-\frac{dA}{dt} = kB^2$ b) $-\frac{dA}{dt} = kA^2$ c) $\frac{dB}{dt} = kA^2$
- The integral equation for a first order reaction ($A \rightarrow B$) is:
a) $A = A_0 \cdot e^{kT}$ b) $A = A_0 \cdot e^{-kT}$ c) $A = A_0 \cdot (0.5)^{t/t_{1/2}}$
- If the half-life of a first order reaction ($A \rightarrow B$) was 20 min., the ratio of A remains after one hour will be: a) 0.100 b) 0.120 c) 0.125
- The specific conductance (L) of solution its resistance (R) and resistivity (r) in electrical cell is: a) $L = K_{\text{cell}} / r$ b) $L = 1 / r$ c) $L = K_{\text{cell}} / R$
when K_{cell} is cell constant.
- The number of electrons in two faraday is: a) 3.20×10^{19} b) 18.06×10^{23} c) 12.04×10^{23}
- The coulombs number necessary to deposit (1 mol) of Ag from Ag(I) solution is:
a) 1.6×10^{19} b) 6.02×10^{23} c) 96500



13. The coulomb represents quantity of electricity carried by:

- a) (1 amp) in (2 sec) b) (1 amp) in (1 sec) c) (0.5 amp) in (2 sec)

14. In electric conductance cell, the relation between resistance (R) and conductivity (L) for electrolytic solution is given by the equations :

- a) $R = L / K_{\text{cell}}$ b) $R = L \cdot K_{\text{cell}}$ c) $R = K_{\text{cell}} / L$

when K_{cell} is cell constant.

Q2: Answer on the following questions: (40 Mark)

- 1) Write only equations to calculate translational, rotational and vibrational components of internal energies for CO gas at (T) temperature.
- 2) Show that the function $\varphi = 8 e^{5x}$ is an eigen function of the operator (d / dx). What is the eigen value?
- 3) Write down only equations of the following concepts: a) Lambert – Beer's law
b) Max plank's equation.

4) For the following first order reactions: $A \xrightarrow{k_1} B \xrightarrow{k_2} C$

Determine the rate equations of $\frac{dB}{dt}$ and $\frac{dC}{dt}$

ملاحظة مهمة: إجابة السؤال الأول تقتصر فقط على وضع دائرة حول الاختيارات الصحيحة إمام كل رقم لسؤال الاختيار.