CONSTANTS

Description	Value
Ideal gas constant (R)	0.0821 L•atm/mol•K = 8.31 J/mol•K
Faraday constant (F)	9.65×10^4 C/mol e^- = 9.65×10^4 J/V•mol e^-
Planck's constant (h)	6.63×10^{-34} J•s
Boltzmann constant (k)	1.38×10^{-23} J/K
Molal freezing point depression constant for water (K_f)	1.86°C/m
Molal boiling point elevation constant for water (K_b)	0.51°C/m
Heat of fusion of water (ΔH_{fus})	334 J/g = 80 cal/g = 6.01 kJ/mol
Heat of vaporization of water (ΔH_{vap})	2260 J/g = 540 cal/g = 40.7 kJ/mol
Specific heat (c_p) of water (*liquid*)	4.184 J/g•K = 4.184 J/g•°C = 1.0 cal/g•°C
Dissociation constant of water (K_w)	1.0×10^{-14} at 25°C
Standard atmospheric pressure	1 atm = 760 mm Hg = 760 torr = 101.325 kPa
Speed of light in a vacuum (c)	3.00×10^8 m/s
1 calorie (cal)	4.184 J
1 watt (W)	1 J/s
Avogadro's number (N_A)	6.02×10^{23}
Molar volume of a gas at STP	22.4 L

FORMULAS

Description	Formula
Ideal gas law	$PV = nRT$
Combined gas law	$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$
Gibbs free energy equation	$\Delta G = \Delta H - T\Delta S$
Nernst equation	$E = E° - \frac{RT}{n\mathrm{F}} \ln Q$ $E = E° - \left(\frac{0.0257\ \mathrm{V}}{n}\right) \ln Q$ at 298 K $E = E° - \left(\frac{0.0592\ \mathrm{V}}{n}\right) \log Q$ at 298 K
Relationship between emf and free energy change for reactants and products in their standard states	$\Delta G° = -nFE°$
Henderson-Hasselbalch equation	$\mathrm{pH} = \mathrm{p}Ka + \log\left(\frac{[\text{conjugate base}]}{[\text{acid}]}\right)$
Photon energy	$E = h\nu$
Speed of light	$c = \lambda\nu$
Nuclear binding energy	$\Delta E = c^2\Delta m$
Amount of heat (q)	$q = mc_p\Delta T$
Root-mean-square speed	$u_{\mathrm{rms}} = \sqrt{\frac{3RT}{M}}$
Graham's law of diffusion	$\frac{r_1}{r_2} = \sqrt{\frac{M_2}{M_1}}$
Relationship between the standard free-energy change and the equilibrium constant	$\Delta G° = -RT\ln K$ $\Delta G° = -2.303\ RT\log K$
Relationship between the standard free-energy change and the free-energy change under nonstandard conditions	$\Delta G° = \Delta G°_{rxn} + RT\ln Q$

NOTES FOR CHEMISTRY TEST

Not all constants and formulas necessary are listed, nor are all constants and formulas listed used on this test.

While attention has been paid to significant figures, no answer should be considered incorrect solely because of the number of significant figures.

Molarity (M)	$\frac{\text{moles solute}}{\text{liters solution}}$
Molality (m)	$\frac{\text{moles solute}}{\text{kilograms solvent}}$
Mole fraction$_A$	$\frac{\text{moles of A}}{\text{moles of A + moles of B + moles of C + . . .}}$