

Moles (amounts of substance)

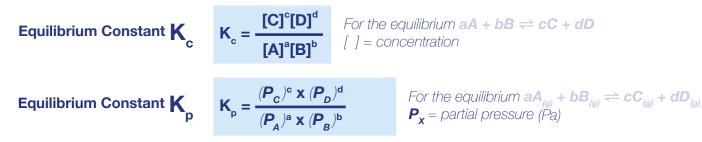
Mass	moles = - mo	mass olar mass	moles molar		g ss = g mol ⁻¹
Solution	moles = con	centration	x volum	e	concentration = mol dm ⁻³ volume = dm ³
Gas	pV = nRT				= gas constant (8.31 J K ⁻¹ mol ⁻¹) = temperature (K)

Energy, Enthalpy and Entropy

		Q = energy chang	te $c = specific heat capacity (J g^{-1} K^{-1})$
Calorimetry	$() - mc \wedge I$	J or kJ)	$\Delta T = temperature change (K or °C)$
Bond Enthalpies	ΔH = ∑(bond ene	ergies of react	tants) - ∑(bond energies of products)
	$\Delta H = chan$	ge in enthalpy (kJ	$I \mod^{-1}$), bond enthalpies = kJ \mod^{-1})
Enthalpy	enthalpy =	oles / change (Q)	enthalpy = $kJ \mod^{-1}$ energy change (Q) = kJ
Gibbs Free Energy	ΔG = ΔH - ΤΔS		ee Energy (kJ mol ⁻¹) $\Delta H = enthalpy change (kJ mol-1) change (kJ K-1 mol-1) T =temperature (K)$
	ΔG = - <i>RT</i> ln K	R = gas consta In = natural loga	$\begin{array}{ll} \text{nt (8.31 J K^{-1} mol^{-1})} & K = \text{rate constant} \\ \text{arithm} & T = \text{temperature (K)} \end{array}$
Entropy	ΔS = ∑S° (product	ts) - ∑S° (reactar	nts) $\Delta S = \text{entropy change } (J K^{-1} \text{ mol}^{-1})$ $S^{\circ} = \text{standard entropy } (J K^{-1} \text{ mol}^{-1})$
	$\Delta S_{(Total)} = \Delta S_{(System)}$	n) + ΔS _{(Surrounding}	gs) $\Delta S = entropy change (J K-1 mol-1) \Delta S_{system} = entropy change of reaction$
	$\Delta S_{(Surroundings)} = \cdot$		ndings) = entropy change of surroundings (kJ K ⁻¹ mol ⁻¹) nthalpy change (kJ mol ⁻¹) aperature (K)
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Equilibrium



Rates of Reaction

Rate Equation	rate = k × [A] ^x [B] ^y [C] ^z		nol dm ⁻³ s ⁻¹ , [] = concentration ers with respect to A, B and C
Arrhenius Equation	$\mathbf{k} = \mathbf{A}\mathbf{e}^{\frac{-\mathbf{E}_a}{\mathbf{R}\mathbf{T}}}$	k = rate con A = constan e = base of	stant t natural log	E _a = activation energy (kJ mol ⁻¹) T = temperature R = gas constant (8.31 J K ⁻¹ mol ⁻¹)
	$ln\mathbf{k} = -\frac{\mathbf{E}_a}{\mathbf{E}_a}$	+ In A In	= natural lo	aarithm

Acids, Bases and pH

Acid Dissociation Constant \mathbf{K}_{a}	$\mathbf{K}_{a} = \frac{[\mathbf{H}_{aq}^{+}][\mathbf{A}_{aq}^{-}]}{[\mathbf{H}\mathbf{A}_{aq}]}$	For the weak acid dissociation $HA \Rightarrow H^* + A^*$ [] = concentration $K_a = acid dissociation constant (mol dm-3)$
рК _а	$\mathbf{pK}_{a} = -\mathbf{log}_{10}\mathbf{K}_{a}$	
Ionic Product of Water \mathbf{K}_{w}	$\mathbf{K}_{w} = [\mathbf{H}_{aq}^{+}][\mathbf{OH}_{aq}^{-}]$	K _w = ionic product of water (mol ² dm ⁻⁶) at 298K, K_w = 1.00 x 10⁻¹⁴ mol² dm⁻⁶
рН	$\mathbf{pH} = -\mathbf{log}_{10}[\mathbf{H}_{\text{\tiny (ac)}}^+]$	$[H^+_{\scriptscriptstyle (aq)}] = concentration of H^+_{\scriptscriptstyle (aq)}$
	$[H^+_{\text{\tiny (aq)}}] = 10^{-pH}$	+





Electrochemistry

Electromotive Force E

 $\mathbf{E}_{\text{cell}} = \mathbf{E}_{\text{reduction}} - \mathbf{E}_{\text{oxidation}}$

$$\begin{split} E_{\rm cell} &= {\rm EMF} \mbox{ (electromotive force) of electrochemical cell (V)} \\ E_{\rm redution} &= {\rm standard \ electrode \ potential \ of \ cathode} \\ E_{\rm oxidation} &= {\rm standard \ electrode \ potential \ of \ anode} \end{split}$$

Conditions for standard electrode potentials = 298K, 1 mol dm⁻³ and 100kPa

Chromatography

Retention Factor \mathbf{R}_{f}	R _f =	Distance travelled by sample	$R_{\rm f} = no \ units$
		Solvent Front	solvent front = distance travelled by solvent

Assorted

Atom Economy	Atom Economy = relative formula mass of desired product x 100				
Atom Economy	relative formula mass of all reactants (sum of)				
Percentage Yield	Percentage Yield = $\frac{\text{actual yield}}{\text{theoretical mass}} \times 100$				
Relative Atomic Mass A r	A _r = (Isotope 1 mass × % abundance) + (Isotope 2 mass × % abundance) total % abundance (100)				
Dilution	$ \begin{array}{l} \mathbf{V_i C_i = V_f C_f} \\ C_i = initial \ volume \\ C_i = initial \ concentration \end{array} \begin{array}{l} V_f = final \ volume \ (after \ dilution) \\ C_f = final \ concentration \ (after \ dilution) \end{array} $				

