

# Equation Sheet for A-Level Chemistry

These are the equations you need to

memorise for your Chemistry A-Level



## Amount of Substance

$$n = \frac{m}{M_r}$$

$$C = \frac{n}{V}$$

$$V = n \times 24$$

$$n = N \times N_A$$

$$pV = nRT$$

$$\text{Atom economy} = \frac{\text{M}_r \text{ of desired product}}{\text{Sum of M}_r \text{ of all reactants}} \times 100$$

$$\% \text{ Yield} = \frac{\text{Actual yield}}{\text{Theoretical yield}} \times 100$$

## Energetics

$$Q = mc\Delta T$$

$$\Delta H = \sum (\text{bond enthalpies in reactants}) - \sum (\text{bond enthalpies in products})$$

## Electrode Potentials

$$E^\ominus = E^\ominus \text{right hand side} - E^\ominus \text{left hand side}$$

## Thermodynamics

$$\Delta G = \Delta H - T\Delta S$$

## Transition Metals

$$\Delta E = h\nu = \frac{hc}{\lambda}$$

## Chemical Equilibria

$$K_c = \frac{[D]^d [E]^e}{[A]^a [B]^b}$$

$$K_p = \frac{(p_D)^d (p_E)^e}{(p_A)^a (p_B)^b}$$

## Rate Equations

$$\text{Rate} = k[A]^m[B]^n$$

Arrhenius is provided but you should be able to use:

$$k = Ae^{-E_a/RT}$$

$$\ln k = -E_a/RT + \ln A$$

## Acids and Bases

$$pH = -\log_{10}[H^+]$$

$$K_w = [H^+][OH^-]$$

$$pK_a = -\log_{10}K_a$$

$$K_a = \frac{[H^+][A^-]}{[HA]}$$

These are the meaning of the symbols on the equation sheet



## Amount of Substance

$n$  = number of moles  
 $m$  = mass  
 $M_r$  = formula mass  
 $C$  = concentration  
 $V$  = volume  
 $N_A$  = Avogadro's constant  
 $p$  = pressure  
 $R$  = gas constant  
 $T$  = temperature

## Rate Equations

$k$  = rate constant  
 $[A]$  = concentration of A  
 $[B]$  = concentration of B  
 $a$  = order wrt A  
 $b$  = order wrt B  
 $A$  = Arrhenius pre exponential factor  
 $e$  = exponential  
 $E_a$  = activation energy

## Energetics

$q$  = heat energy  
 $m$  = mass  
 $c$  = specific heat capacity  
 $\Delta T$  = change in temperature  
 $\Delta H$  = enthalpy change

## Electrode Potentials

$E^\ominus$  = electrode potential

## Thermodynamics

$\Delta G$  = Gibbs free energy  
 $\Delta H$  = enthalpy change  
 $T$  = temperature  
 $\Delta S$  = change in entropy

## Transition Metals

$\Delta E$  = change in energy  
 $h$  = Planck's constant  
 $\nu$  = frequency

## Chemical Equilibria

$K_c$  = Equilibrium constant (wrt concentration)  
 $K_p$  = Equilibrium constant (wrt pressure)  
 $[A] / (A)$  = concentration/ partial pressure of reactant A  
 $[B] / (B)$  = concentration/ partial pressure of reactant B  
 $[D] / (D)$  = concentration/ partial pressure of product D  
 $[E] / (E)$  = concentration/ partial pressure of product E  
 $a$  = moles of A from balanced equation  
 $b$  = moles of B from balanced equation  
 $d$  = moles of D from balanced equation  
 $e$  = moles of E from balanced equation

## Acids and Bases

$[H^+]$  = concentration of  $H^+$   
 $[OH^-]$  = concentration of  $OH^-$   
 $[A^-]$  = concentration of salt

# Mcmuc A Level Chemistry

**M Lipman**



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