

# CHEM4 – Kinetics, Equilibria and Organic Chemistry

## Definitions to Learn

### 1. Kinetics

Rate of reaction	change in concentration of reactants or products in a given time (units are mol dm <sup>-3</sup> s <sup>-1</sup> )
Order of reaction	power of reactant's concentration in the rate equation
Overall order of reaction	sum of powers of concentration terms in rate equation
Rate constant	the constant of proportionality, k, in the rate equation

### 2. Equilibria

Homogeneous system	all reactants and products are in the same phase
Heterogeneous system	reactants and products are not all in the same phase

### 3. Acids and Bases

Bronsted-Lowry acid	proton donor
Bronsted-Lowry base	proton acceptor
Strong acid or base	fully dissociated in water
Weak acid or base	partially dissociated in water
pH	$\text{pH} = -\log_{10}[\text{H}^+]$
[H <sup>+</sup> ]	$10^{-\text{pH}}$
K <sub>w</sub> (ionic product of water)	$K_w = [\text{H}^+][\text{OH}^-]$
K <sub>a</sub>	$K_a = \frac{[\text{H}^+][\text{A}^-]}{[\text{HA}]}$
pK <sub>a</sub>	$\text{pK}_a = -\log[K_a]$
Buffer solution	resists changes in pH when small amount of acid or base is added
Equivalence	Point in a titration where moles of acid equals moles of base
Conjugate acid-base pairs	Two species differing by H <sup>+</sup>

### 6. Nitrogen Compounds

Zwitter ion	an ion, typically found in amino acids, that has both a positive and a negative charge
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## 7. Polymers

Condensation polymerisation      reaction between two different types of molecule to give a polymer accompanied by the loss of a small molecule such as water

## 8. Isomerism, Synthesis and Analysis

Stereoisomers                              Compounds with the same structural formula but different arrangements of atoms in space

Chiral centre                                carbon atom bonded to four different atoms or groups of atoms

Optical isomerism                        isomerism arising from molecules being chiral i.e. being non-superimposable mirror images

Optical activity                              ability of chiral molecules to rotate plane-polarised light

Enantiomer                                    an optical isomer

Racemate  
(or racemic mixture)                      equal mixture of enantiomers that is optically inactive