4 · Rates, Equilibria and Further Organic Chemistry

Pearson Edexcel · International A-Level · Chemistry · Vocabulary in context

Word	Example
rate equation /reɪt ɪ'kweɪʒn/	The **rate equation** is rate = k[A][B]. rate = k[A][B]
order /'ɔ:də/	A reactant with **order** two makes the rate four times faster when its concentration doubles.
rate constant /reɪt 'kɒnstənt/	The **rate constant** k gets larger at higher temperature. k
half-life /hɑ:f laɪf/	After one **half-life**, half the nuclei have decayed.
conductivity /kɒndək'tɪvɪti/	The solution's **conductivity** falls as ions are used up.
hydrolysis /haɪ'drɒləsɪs/	**Hydrolysis** uses water to break a large molecule into smaller ones.
rate-determining step /reɪt dɪ'tɜ:mɪnɪŋ step/	The slowest step is the **rate-determining step**.
intermediate /ˌɪntə'mi:dɪət/	An **intermediate** forms in one step and is used up in the next.
catalyst /'kætəlɪst/	A **catalyst** speeds up a reaction without being used up.
pre-equilibrium /pri: ˌi:kwɪ'lɪbrɪəm/	A fast **pre-equilibrium** forms the intermediate before the slow step.
halogenoalkane /'heɪlədʒnəʊlkeɪn/	Bromoethane is a **halogenoalkane**.

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homogeneous catalyst /hə'mɒdʒnɪəs 'kætəlɪst/	A **homogeneous catalyst** is in the same phase as the reactants.
heterogeneous catalyst /ˌhetrə'dʒi:nɪəs 'kætəlɪst/	Iron is a **heterogeneous catalyst** in the Haber process.
activation energy /ˌæktɪ'veɪʃn 'enədʒi/	A match gives the **activation energy** to start the fire.
equilibrium constant /ˌi:kwɪ'lɪbrɪəm 'kɒnstənt/	A large **equilibrium constant** means mostly products.
Entropy /'entrəpi/	**Entropy** measures how spread out energy and matter are.
total entropy change /'təʊtl 'entrəpi tʃeɪndʒ/	A positive **total entropy change** means the reaction can happen by itself.
Thermodynamic stability /ˌθɜ:məʊdaɪ'næmɪk stə'bɪlɪti/	**Thermodynamic stability** asks whether a reaction is favoured at all.
Kinetic stability /kɪ'netɪk stə'bɪlɪti/	Diamond has **kinetic stability**: it does not turn into graphite at a noticeable speed.
lattice energy /'lætɪs 'enədʒi/	Magnesium oxide has a large **lattice energy**.
electron affinity /ɪ'lektrɒn ə'fɪnɪti/	Chlorine has a negative first **electron affinity**: energy is released.
Born–Haber cycle /bɔ:n 'heɪbə 'saɪkl/	A **Born–Haber cycle** finds the lattice enthalpy.
atomisation /əˌtɒmaɪ'zeɪʃn/	**Atomisation** turns an element into one mole of gas atoms.

Word	Example
covalent character /ˈkəʊvələnt ˈkærɪktə/	A small, highly charged cation gives an ionic solid some **covalent character**.
Hydration enthalpy /haɪˈdreɪʃn enˈθælpi/	**Hydration enthalpy** is released when gas ions dissolve in water.
partial pressure /ˈpɑːʃl ˈpreʃə/	The **partial pressure** of oxygen in air is about 21 kPa. 21 kPa
mole fraction /məʊl ˈfrækʃn/	The **mole fraction** of nitrogen in air is about 0.78. 0.78
acid /ˈæsɪd/	Lemon juice is an **acid**.
base /beɪs/	Sodium hydroxide is a **base**.
conjugate /ˈkɒndʒuːgeɪt/	NH_4^+ is the **conjugate** acid of NH_3. NH_4^+ NH_3
strong acid /strɒŋ ˈæsɪd/	Hydrochloric acid is a **strong acid**.
weak acid /wiːk ˈæsɪd/	Vinegar contains a **weak acid**.
dissociation /dɪˌsəʊsɪˈeɪʃn/	A weak acid shows only partial **dissociation** into ions.
monoprotic	HCl is **monoprotic**: each molecule gives one H^+ ion. HCl H^+
buffer solution /ˈbʌfə səˈluːʃn/	A **buffer solution** keeps the pH almost the same. pH
equivalence point /ɪˈkwɪvələns pɔɪnt/	At the **equivalence point**, the acid and base have exactly reacted.
titration curve /taɪˈtreɪʃn kɜːv/	The **titration curve** rises sharply at the end point.

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titrant	The **titrant** is the solution in the burette.
indicator /ˈɪndɪkeɪtə/	The **indicator** changes colour at the end point.
half-neutralisation	At **half-neutralisation** of a weak acid, pH = pKa. pH = pKa
chiral centre /ˈkaɪrəl ˈsentə/	A carbon with four different groups is a **chiral centre**.
enantiomers /eˈnæntɪəməz/	Two **enantiomers** are mirror images that cannot be placed on top of each other.
plane-polarised /pleɪn ˈpəʊlərəraɪzd/	After the filter, the light is **plane-polarised**.
racemic mixture /rəˈsiːmɪk ˈmɪkstʃə/	A **racemic mixture** has equal amounts of two optical isomers.
aldehyde /ˈældɪhaɪd/	Ethanal is an **aldehyde**.
ketone /ˈketəʊn/	Propanone is a **ketone**.
carbonyl /ˈkɑːbənaɪl/	Aldehydes and ketones both have a **carbonyl** group, C=O. C=O
Tollens' reagent /ˈtəʊlənz rɪˈeɪdʒənt/	An aldehyde makes a silver mirror with **Tollens' reagent**.
nucleophilic addition /ˌnjuːklɪəˈfɪlɪk əˈdɪʃn/	Hydrogen cyanide reacts with a ketone by **nucleophilic addition**.
iodoform test /ˈaɪədɒfɔːm test/	The **iodoform test** gives a yellow precipitate with $CH_3CO–$ compounds. $CH_3CO–$
nitrile /ˈnaɪtraɪl/	Ethanenitrile is a **nitrile**: it has a C≡N group. C≡N

Word	Example
reflux /'ri:flʌks/	Heat under **reflux** so that nothing boils away.
acyl chloride /ə'kɪl 'klɔ:raɪd/	Ethanoyl chloride is an **acyl chloride**.
esterification /ˌestəˌrɪfɪ'keɪʃn/	**Esterification** joins an alcohol and an acid to make an ester.
amine /'æmaɪn/	Methylamine is an **amine**.
amide /ə'maɪd/	Ethanamide is an **amide**.
polyester /ˌpɒlɪ'estə/	Polyester is used to make clothes; each **polyester** chain has many ester links.
condensation /kɒnden'seɪʃn/	In **condensation**, two molecules join and give off water.
chemical shift /'kemɪkl ʃɪft/	The **chemical shift** of this peak is 2.1 ppm. 2.1 ppm
integrated areas /'ɪntɪgreɪtɪd 'eərɪəz/	The **integrated areas** under the peaks show how many protons each peak has.
splitting /'splɪtɪŋ/	The **splitting** of a peak shows how many hydrogens are next to it.
chromatography /krəʊmə'tɒgrəfi/	**Chromatography** separates the dyes in ink.
stationary phase /'steɪʃənəri feɪz/	The paper is the **stationary phase**.
mobile phase /'məʊbaɪl feɪz/	The solvent is the **mobile phase**: it moves up the paper.
HPLC	**HPLC** separates a mixture by pumping a liquid through a packed column.

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gas chromatography	**Gas chromatography** separates volatile compounds by retention time.
retention time /rɪ'tenʃn taɪm/	Ethanol has a **retention time** of 3 minutes on this column. 3 minutes
mass spectrometry /mæs spek'trɒmətri/	**Mass spectrometry** gives the molecular mass of each compound.