Nature's Chemistry

(a) Homologous series

Systematic carbon chemistry

	RP1	RP2	RP3
A **homologous series** is a **family of compounds** with the **same general formula** and **similar chemical properties**.	Y/N	Y/N	Y/N
Patterns are often seen in the **physical properties** of the **members** of a **homologous series**.	Y/N	Y/N	Y/N
The **subsequent members** of a **homologous series** show a **general increase** in their **melting** and **boiling points**. This **pattern** is attributed to **increasing strength** of the **intermolecular forces** as the **molecular size increases**. *The type of intermolecular force does not need to be identified.*	Y/N	Y/N	Y/N
Hydrocarbons are compounds containing **only hydrogen** and **carbon** atoms.	Y/N	Y/N	Y/N
Compounds containing only **single carbon-carbon bonds** are described as **saturated**.	Y/N	Y/N	Y/N
Compounds containing **at least one carbon-carbon double bond** are described as **unsaturated**.	Y/N	Y/N	Y/N
It is **possible to distinguish** an **unsaturated** compound from a **saturated** compound using **bromine solution**.	Y/N	Y/N	Y/N
Unsaturated compounds **decolourise bromine solution quickly**.	Y/N	Y/N	Y/N
The **structure** of any molecule can be drawn as a **full** or a **shortened structural formula**.	Y/N	Y/N	Y/N

Isomers:			
♦ are **compounds** with the **same molecular formula** but **different structural formulae**	Y/N	Y/N	Y/N
♦ may **belong** to **different homologous series**	Y/N	Y/N	Y/N
♦ usually have **different physical properties**	Y/N	Y/N	Y/N
Given a **structural formula** for a compound, an **isomer** can be **drawn**.	Y/N	Y/N	Y/N
Isomers can be **drawn** for a **given molecular formula**.	Y/N	Y/N	Y/N
Alkanes			
Alkanes:			
♦ are a **homologous series** of **saturated hydrocarbons**	Y/N	Y/N	Y/N
♦ are commonly **used as fuels**	Y/N	Y/N	Y/N
♦ are **insoluble in water**	Y/N	Y/N	Y/N
♦ can be represented by the **general formula C_nH_{2n+2}**	Y/N	Y/N	Y/N
Straight-chain and **branched alkanes** can be **systematically named** from **structural formulae** containing **no more than 8 carbons** in the **longest chain**.	Y/N	Y/N	Y/N
Molecular formulae can be **written** and **structural formulae** can be **drawn**, from the **systematic names** of **straight-chain and branched alkanes**, containing **no more than 8 carbons** in the **longest chain**.	Y/N	Y/N	Y/N

Cycloalkanes

Cycloalkanes:

♦ are a **homologous series** of **saturated, cyclic hydrocarbons**	Y/N	Y/N	Y/N
♦ are **used as fuels and solvents**			
♦ are **insoluble in water**	Y/N	Y/N	Y/N
♦ can be represented by the **general formula C_nH_{2n}**	Y/N	Y/N	Y/N
Cycloalkanes (C_3–C_8) can be **systematically named** from **structural formulae**. *Branched cycloalkanes are not required.*	Y/N	Y/N	Y/N
Molecular formulae can be **written** and **structural formulae** can be **drawn** from the **systematic names** of **un-branched cycloalkanes**.	Y/N	Y/N	Y/N

Alkenes

Alkenes:

♦ are a **homologous series** of **unsaturated hydrocarbons**	Y/N	Y/N	Y/N
♦ are **used to make polymers and alcohols**	Y/N	Y/N	Y/N
♦ are **insoluble in water**	Y/N	Y/N	Y/N
♦ contain the **C=C double bond functional group**	Y/N	Y/N	Y/N
♦ can be represented by the **general formula C_nH_{2n}**	Y/N	Y/N	Y/N
Straight-chain and **branched alkenes** can be **systematically named** indicating the **position of the double bond**, from **structural formulae** containing **no more than 8 carbon atoms** in the **longest chain**.	Y/N	Y/N	Y/N

Molecular formulae can be **written** and **structural formulae** can be **drawn**, from the **systematic names of straight-chain** and **branched alkenes**, containing **no more than 8 carbons** in the **longest chain**.	Y/N	Y/N	Y/N
Chemical equations can be **written** for the **addition reactions** of **alkenes**, using **molecular** or **structural formulae**.	Y/N	Y/N	Y/N
Alkenes undergo addition reactions:			
♦ **with hydrogen** forming **alkanes**, known as **hydrogenation**	Y/N	Y/N	Y/N
♦ with **halogens** forming **dihaloalkanes**	Y/N	Y/N	Y/N
♦ with **water** forming **alcohols**, known as **hydration**	Y/N	Y/N	Y/N

Nature's Chemistry

(b) Everyday consumer products

Alcohols

	RP1	RP2	RP3
Alcohols are **used as fuels** as they are **highly flammable** and **burn with very clean flames**.	Y/N	Y/N	Y/N
Alcohols are often **used as solvents**.	Y/N	Y/N	Y/N
Methanol, **ethanol** and **propanol** are **miscible with water**, **thereafter the solubility decreases as size increases**.	Y/N	Y/N	Y/N
As alcohols **increase in size** their **melting** and **boiling points increase** due to the **increasing strength of the intermolecular forces**. *The type of intermolecular force does not need to be identified.*	Y/N	Y/N	Y/N
An **alcohol** is a **molecule** containing a **hydroxyl functional group**, **—OH group**.	Y/N	Y/N	Y/N
Saturated, **straight-chain alcohols** can be represented by the **general formula $C_nH_{2n+1}OH$**.	Y/N	Y/N	Y/N
Straight-chain alcohols can be **systematically named** indicating the **position of the hydroxyl group** from **structural formulae** containing **no more than 8 carbon atoms**.	Y/N	Y/N	Y/N
Molecular formulae can be **written** and **structural formulae** can be **drawn**, from the **systematic names** of **straight-chain alcohols**, containing **no more than 8 carbons**.	Y/N	Y/N	Y/N

Carboxylic acids

Carboxylic acids are **used** in the preparation of **preservatives**, **soaps** and **medicines**.	Y/N	Y/N	Y/N
Vinegar is a **solution of ethanoic acid**, with **molecular formula** CH_3COOH.	Y/N	Y/N	Y/N
Vinegar is **used** in **household cleaning products** as it is a **non-toxic acid** so can be **used safely** in **household situations**.	Y/N	Y/N	Y/N
Methanoic, **ethanoic**, **propanoic** and **butanoic acid** are **miscible in water**, **thereafter the solubility decreases as size increases**.	Y/N	Y/N	Y/N
As carboxylic acids **increase in size** their **melting** and **boiling points** increase due to the **increasing strength of the intermolecular forces**. *The type of intermolecular force does not need to be identified.*	Y/N	Y/N	Y/N
Carboxylic acids can be identified by the **carboxyl functional group, —COOH**.	Y/N	Y/N	Y/N
Saturated, **straight-chain carboxylic acids** can be represented by the **general formula** $C_nH_{2n+1}COOH$.	Y/N	Y/N	Y/N
Straight-chain carboxylic acids can be **systematically named** from **structural formulae** containing **no more than 8 carbons**.	Y/N	Y/N	Y/N
Molecular formulae can be **written** and **structural formulae** drawn, from the **systematic names** of **straight-chain carboxylic acids**, containing **no more than 8 carbons**.	Y/N	Y/N	Y/N
Solutions of carboxylic acids have a **pH less than 7** and like other acids, can **react with metals**, **metal oxides**, **hydroxides** and **carbonates** forming **salts**.	Y/N	Y/N	Y/N
Salts formed from **straight chain carboxylic acids** containing **no more than 8 carbons**, can be **named**.	Y/N	Y/N	Y/N

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(c) Energy from fuels

	RP1	RP2	RP3
A **reaction or process** that **releases heat energy** is described as **exothermic**.	Y/N	Y/N	Y/N
A **reaction or process** that **takes in heat energy** is described as **endothermic**.	Y/N	Y/N	Y/N
In **combustion**, a **substance reacts** with **oxygen releasing energy**.	Y/N	Y/N	Y/N
Hydrocarbons and **alcohols burn** in a **plentiful supply of oxygen** to **produce carbon dioxide** and **water**.	Y/N	Y/N	Y/N
Equations can be **written** for the **complete combustion** of **hydrocarbons** and **alcohols**.	Y/N	Y/N	Y/N
Fuels burn releasing different quantities of energy.	Y/N	Y/N	Y/N
The **quantity of heat energy released** can be determined **experimentally** and calculated using, $E_h = cm\Delta T$.	Y/N	Y/N	Y/N
The quantities E_h, c, m or ΔT can be **calculated**, in the **correct units**, given relevant data.	Y/N	Y/N	Y/N
Calculations can involve heating **substances other than water**.	Y/N	Y/N	Y/N
It is **not** necessary to calculate the **enthalpy per mole** of substance burned.	Y/N	Y/N	Y/N