1	Hydrocarbons are molecules made of hydrogen and carbon only. Theyare joined by a covalent bond.
2	Alkanes have a general formula CnH2n+2(fig.1).
3	Alkenes have a general formula CnH2n(fig.2).
4	Alkanes are saturated meaning they contain only single bonds.
5	Alkenes are unsaturated as they contain a double bond: C=C This is known as a functional group.
6	Molecules can have the functional group in different places meaning ithas the same molecular formula but arranged differently. This is calledan isomer (fig.3).
7	When hydrocarbon burn completely in oxygen this is called completecombustion and carbon dioxide and water is made.
8	When there is not a plentiful supply of oxygen then full oxidation of thehydrocarbon cannot occur which is called incomplete combustion.Carbon monoxide can be formed.
9	Carbon monoxide is a poisonous gas.
10	You can test for the presence of alkanes using bromine water. If analkane is present the solutionturnsclear. An alkene present will keepthe solution orange.
11	When an alkane is added to bromine water this is called an addition reaction (fig.4).

Fig.1

Fig.2

Fig.3

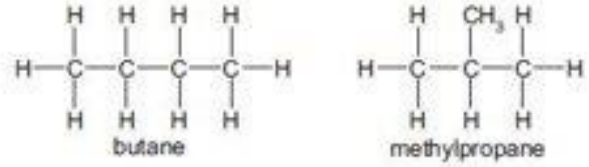
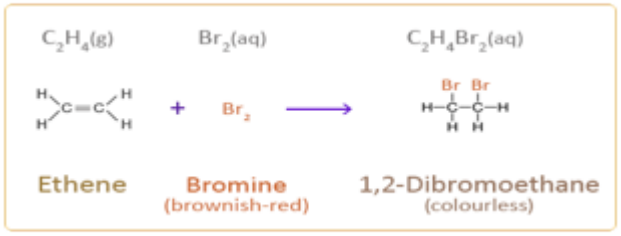


Fig.4



1	Alcoholic drinks contain ethanol which has a formula: C2H5OH
2	Ethanol for alcoholic drinks is made via fermentation (plant material,containing sugars, is mixed with water and yeast): glucose = ethanol + carbondioxoide
3	Duringfermentationthe pH and temperature need to be controlled toensure the enzymes in the yeast ensure it occurs.
4	Fermentation is an anaerobic (absence of oxygen) process.
5	Alcohol names tend to end in '-anol' and have a general formula: CnH2n+1
6	Alcohols all: -produce carbon dioxide and water upon complete combustion. -react with reactive metals forming hydrogen gas. -can be oxidized to form carboxylic acids.
7	Alcohols contain the functional group –OH
8	Carboxylic acid all have the general formula: CnH2n+1COOH
9	All carboxylic acids contain the functional group -COOH
10	Carboxylic acids have similar properties such as: -form solutions with a pH less then 7 if soluble
11	-they react with metals to form a salt and hydrogen gas
12	-they react with bases to form a salt and water
13	-they react with metal carbonates to form a salt, water and carbondioxide.
14	Theacidicpropertiesofcarboxylicacidsaredueto–COOHwhichforms a hydrogen ion in solution.
15	The rest of the molecule forms a negative charged ion that formsthe salt.
16	Carboxylic acids have their own homologous series (fig.1)

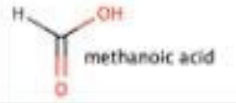
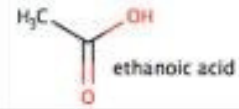
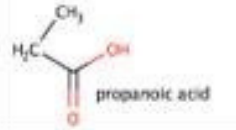
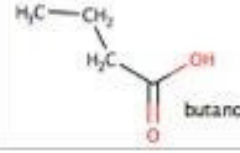
Name of carboxylic acid	Molecular formula	Structural formula	Displayed formula
Methanoic acid	H_2CO_2	HCOOH	
Ethanoic acid	$C_2H_4O_2$	CH_3COOH	
Propanoic acid	$C_3H_6O_2$	CH_3CH_2COOH	
Butanoic acid	$C_4H_8O_2$	$CH_3CH_2CH_2COOH$	

Fig.1

1	A polymer is a large molecule made up of smaller molecules called monomers.
2	The process in which monomersjoin togetherto form a polymer is called polymerisation.
3	Alkenes have double bonds. If the double bond isbrokenthen anotheralkene molecule can be added to it. This happensover and over againforming a long chain. This is called additionpolymerisation.
4	The structural formulae for a polymer can be drawn as a repeating unit.Fig.1 shows this for polyethene andpolychloroethene.
5	Naturally occurring polymers are DNA, starch proteins.
6	The general equation for addition polymerization is shown in fig.2.
7	Polymers have different uses depending on their properties. Fig. 3 givesexamples of these.
8	Polyesters synthetic polymers made by condensationpolymerisationinwhich monomersjoin togetherand eliminate a small molecule such aswater.
9	Esters are organic compounds that contain the functional group –COO- which can be drawn as shown in fig.4.
10	Esters are formed when a carboxylic acid reacts with an alcohol in thepresence of a catalyst. This is a condensation reaction because water isformed.
11	Polymers are non-biodegradableand it is very difficult to recycle themas many steps are required (fig 5).

Fig.1

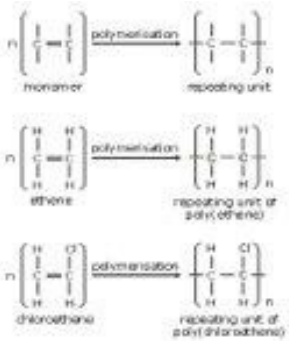


Fig.2

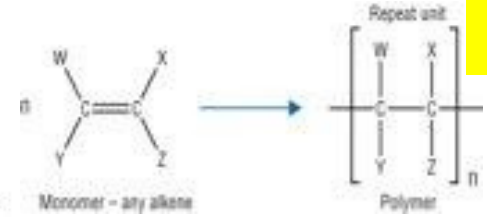
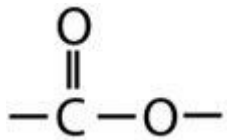


Fig.3

Fig.4



Polymer	Typical use
Poly(ethene)	Plastic bags and bottles
Poly(propene)	Crates and ropes
Poly(chloroethene)	Water pipes and insulation on electricity cables

Fig.5

Step 1	**Collect waste-requires kerbside collection which isexpensive**
Step 2	**Separate waste-time consuming and expensive**
Step 3	**Dispose of waste that are not polymers. Need landfillsites**
Step 4	**Clean polymers and grind into chippings**
Step 5	**Purify chippings**
Step 6	**Melt chippings and process into new prodFuicgt.1**

1	Flame tests are used to identify metal ions in substances.
2	Platinum wire loops are used in flame tests as they are unreactive andcleaned in hydrochloric acid prior to a test to clean it.
3	Different cations (positive ion) produce differentcolours(fig.1).
4	Aflame photometercanbeusedtodeterminetheconcentrationofametalionina dilute solution by measuring light intensity.
5	A flame from a test is normally a mixture ofcolours. A flamephotometer can be used to separate the light into a spectrum.
6	Different metals ions have an individual emission spectra, this can beused to identify the metal ion.
7	Precipitation reactions involving sodium hydroxide can be used toidentify dissolved metal ions in unknown solutions. Different metal ionsproduce differentcolouredprecipitates (fig.2).
8	Ammonia changes thecolourof damp red litmus paper to blue. This iscalled a confirmatory test to confirm the presence of ammonia.
9	To test for carbonateionsyou add the solution to dilute hydrochloricacid. If it bubbles carbondioxidethen the carbonate ions are present.(note: limewater turning a milkycolouris attest for carbon dioxide).
10	To test for sulfateionsyou add: 1.a few drops of dilute hydrochloric acid 2.a few drops of barium chloride 3.if a white precipitate of barium sulfateformsthen sulfate ions arepresent. 4.
11	To test for halideionsyou add: 1.a few drops of dilute nitric acid 2.a few drops of silver nitrate 3.this forms a silver halide precipitate. Thecolourof the precipitatedetermines what halide ion is present (fig. 3) 4.

Fig.1

Flame Tests for Metal Ions

Metal Ion	Flame Colour
Potassium(K^+)	Lilac
Sodium(Na^+)	Yellow
Lithium(Li^+)	Crimson
Calcium(Ca^{2+})	Red
Copper(II)(Cu^{2+})	Blue-green

Fig.2

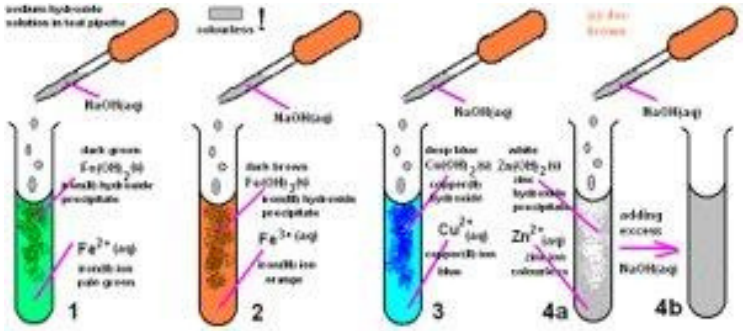
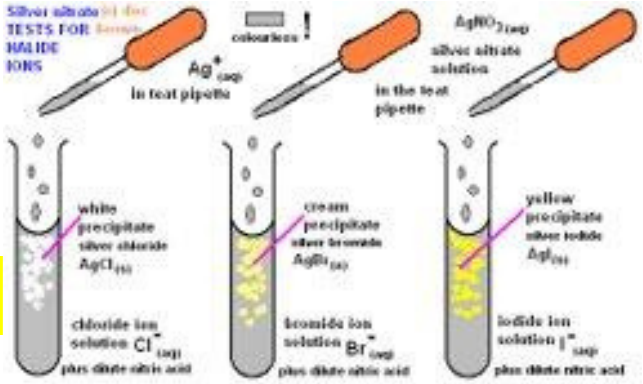


Fig.3



1	Ceramics are a range of materials that are not affected by heat. Theyare: -chemically unreactive -hard but brittle -poor thermal and electrical conductors -materials with high melting points.
2	Brick, porcelain and china are clay ceramics.
3	Glass is made by melting sand, then allowing it to cool and solidify.
4	Atoms in glass are not arranged in a regular pattern to form crystalswhich is why it is transparent and not opaque.
5	A composite material is a mixture of two or more materials. Thiscombination will produce a material with improved properties.
6	An example of a composite material is Pykrete which consists of ice and14% wood pulp.
7	Concrete is formed by sand and aggregate acting as a reinforcement.This reinforcement is bonded together by cement, acting as a matrix.
8	Wood is a natural composite consisting of cellulosefibresin a matrix ofa polymer called lignin.
9	Plywood consists of odd numbers of this sheets of wood, each glued atright angles to the sheet below.
10	Lumps and powders are examples of bulk materials. They contain ahuge number of atoms.
11	Nanoparticles typically consist of just a few hundred atoms and are 1-100nm in size.
12	1 nm is 1 millionth of a mm. 1nm = 1/1,000,000 of 1mm
13	Substances that contain nanoparticles are callednanoparticulates.Their uses depend upon the size of the nanoparticles and theirsurface area to volume ratios. Fig.1 shows some of their uses.
14	Some scientists worry that nanoparticles could pose as a threat tohumans because of their small sizee.g.getting breathed easily.
15	Another risk is that their large surface area to volume ratio mayallow them tocatalyseharmful reactions.
16	It is difficult to determine risk as nanoparticles have not beenaround for a long time.