

F4 C9

Definition:

- Alloy is a mixture that is made out of two or more elements in which the major component is metal.
- Polymer = long-chain molecule made up of monomers
- Monomers = the identical repeating units in the polymer

Sulphuric acid:

- colourless ,pungent smell and poisonous gas
- causing breathing difficulties

Acid rain

- corrodes buildings
- soil acidic(not suitable for most crops)
- kills animals and marine lives / river become acidic ,kill aquatic organisms

Uses

- chemical fertilisers
- paint(neutralisation of sulphuric acid with barium hydroxide solution produces barium sulphate which is used in paint)
- detergents
- synthetic fibres
- electrolyte(Lead-acid accumulator)
- cleaning metals(remove surface oxides)

Laboratory:

- drying agent
- dehydrating agent
- catalyst
- strong acid

Manufacture

Contact process

- Stage 1 : Production of sulphur dioxide from sulphur
 $S + O_2 \rightarrow SO_2$
- Stage 2 : Production of sulphur trioxide from sulphur dioxide
 $2SO_2 + O_2 \rightleftharpoons 2SO_3$
Temperature : 450 C
Pressure : 1 atm
Catalyst : Vanadium(5) oxide
- Stage 3 : Conversion of sulphur trioxide to sulphuric acid
(I) $SO_3 + H_2SO_4 \rightarrow H_2S_2O_7$ (oleum)
(II) $H_2S_2O_7 + H_2O \rightarrow 2H_2SO_4$

*Stage 3 addition of sulphuric trioxide into water.The reaction is vigorous ,a lot of heat is given off ,a large cloud of sulphuric acid fumes is produced ,cause corrosive and cause pollution in air
 $SO_3 + H_2O \rightarrow H_2SO_4$

Ammonia and its salt

Ammonia Gas

- colourless and pungent smell
- soluble in water
- turn damp red litmus paper to blue

Uses:

- fertilisers : Reaction of ammonia with acids produce ammonium fertilisers
 $NH_3 + HNO_3 \rightarrow NH_4NO_3$ (ammonium nitrate)
- manufacture nitric acid
- making synthetic fibre
- as a degreasing agent 抗油
- cooling agent in refrigerator

- neutralise the acid produced by bacteria in latex, preventing latex from coagulating
- form ammonium chloride (electrolyte in dry cell)

Manufacture of nitric acid (Ostwald process)

Catalyst : Platinum
 Temperature : 900 C

Manufacture of Ammonia (Haber process)

Temperature : 450 C
 Pressure : 200-500 atm
 Catalyst : iron
 $N_2 + 3H_2 \rightleftharpoons 2NH_3$

Alloy

- increase the strength of the metals (harder and stronger)
- improve the resistance to corrosion (Prevent corrosion)
- Enhancing the appearance (More attractive)

Atoms of pure metals are of the same size, they are arranged orderly in a regular layered pattern. When a force is applied, layers of atoms slide easily over one another. This makes pure metals soft, malleable and ductile.

A small amount of another metal is added, these atoms disrupt the orderly layered arrangement of pure metal. This is because the atoms of both metals are different in size. When a force is applied, layers of atoms slide difficultly over each other.

Alloy

-Brass : making of ornaments

70% copper
 30% zinc

-Bronze : medals, statues

90% copper
 10% tin

-High carbon steel : hammers

99% iron
 1% carbon

-Stainless steel : knives, spoons

-Pewter : souvenirs

-Duralumin : aircraft (light, strong, durable)

-Cupronickel : silver coin

Synthetic polymers

Polymerisation = process joining together a large number of monomers to polymers

Natural polymer

- latex
- silk
- starch
- protein

Synthetic polymer

Advantages

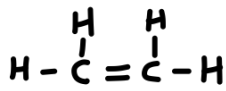
- Cheap ,light-weight ,translucent
- easily coloured ,easily moulded
- non-corrosive ,waterproof ,good insulators
- resistant to rust ,decay ,chemical attack

Disadvantages

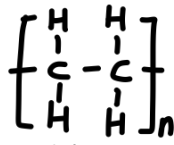
- flammable (poisonous fumes causing air pollution)
- non-biodegradable

Uses

- not reactivity
- resistant to acids and alkalis

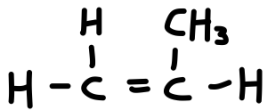


Ethene, C_2H_4

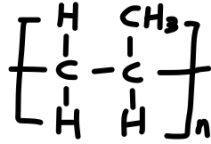


polythene, $(\text{C}_2\text{H}_4)_n$
(polyethylene)

- Making plastic bag
- plastic film (wrapping fresh vegetables)



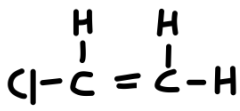
propene, C_3H_6



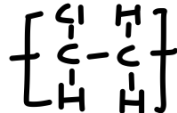
Polypropene, $(\text{C}_3\text{H}_6)_n$

- easily moulded into different shapes

- making plastic bottles



chloroethene, $\text{C}_2\text{H}_3\text{Cl}$
(vinyl chloride)



Polychloroethene,
 $(\text{C}_2\text{H}_3\text{Cl})_n$, PVC

- does not rust
- does not conduct electricity

- making waterproof and insulating material
- water pipes

Phenylethene (styrene) , $\text{C}_2\text{H}_3\text{C}_6\text{H}_5$

Polyphenylethene (polystyrene)

- Making materials for packaging electrical goods(easily moulded into different shapes)
- Making disposable cups and food container

Methyl methacrylate (2-methyl propenoate)

Polymethyl methacrylate (acryl)

- Making of aircraft wing (light)
- Making of vehicle windscreens and plastic lenses (transparent)

Dicarboxylic acid / Diamine

Nylon

- Making of synthetic fibre (clothing and curtain materials)
- Making umbrella

Glass and Ceramics

Glass

- transparent ,hard but brittle
- heat and electric insulator
- resistant to corrosion
- resistant to chemical attack

-easy to maintain

-Fused glass : Lenses

Silicon dioxide

~High temperature and chemical durability

-Soda-lime glass : Containers

Silicon dioxide

Sodium oxide

Calcium oxide

~Low melting point

~Easy to moulded and shape

-Borosilicate glass : Laboratory glassware

Silicon dioxide

Boron oxide

Sodium oxide

Calcium oxide

~Resistant to chemical

~Can withstand wide range of temperature change

-Lead crystal glass : Crystals

Silicon dioxide

Lead(II) oxide

Sodium oxide

~High refractive index

Ceramic

-hard ,strong but brittle

-high melting point and remain stable at high temperature

-heat and electric insulators

-resistant to corrosion and wear

-chemically not reactive

-do not readily deform under stress

Uses

-roof tiles

-bricks

-cement

-pottery

Composite materials (structural materials that is formed by combining 2 or more different substances)

-Reinforced concrete

~Hard

~Performs poorly under tension

-Superconductor

~No resistance to the flow of electricity

-Fibre optic

~Transmit signal in the form of light impulses

-Fibre glass

~Fibre glass reinforced plastic are used in the building industry ,car ,panels ,boats

-Photochromic glass (Silver chloride + copper(II) chloride + molten silicon dioxide)

~darkens when exposed to strong sunlight.