Corrosion is the destruction of materials by chemical reactions with substances in the environment. An example is the rusting of iron when iron reacts with oxygen and water.

Method of prevention	How it works
Coat metal (paint, oil, grease, plastic)	Provides a barrier between metal and/or oxygen and water.
Store in an **anhydrous** compound	The compound absorbs the water from the air so it can t react with metal.
Store in boiled water with stopper / oil	Boiling water releases dissolved O_2 gas and the oil stops it returning.
Sacrificial protection (galvanisation)	Coat a metal with a more reactive metal. Zinc protects iron by reacting with the oxygen instead.

Alloys :
A metal mixed with another metal or carbon to give beneficial properties, often increased strength or corrosion resistance. The other element distorts the regular pattern of metal atoms, So atoms can t slide easily in rows.

Alloy	Elements	Use
Bronze	Cu & Sn	Statues
Brass	Cu & Zn	Door handles
Steel	Fe & C	Construction, buildings
Stainless steel	Fe, C, Cr & Ni	Cutlery, Surgical equipment does not rust

Aluminium alloys are low density so used in aircraft. Gold alloys are measured in carats, 24-carat is 100% gold, 18-carat is 75%.

Composites : mixed materials to give beneficial properties

Glass is made mostly of sand (SiO_2) plus:

Sodalime glass	Sodium carbonante (the soda) and calcium carbonate (lime). Used for milk bottles and jars.
Borosilicate glass	Boron trioxide is added. This adds heat resistance. Used for boiling tubes and oven dishes. Does not melt as easily.

Both of these structures have NO order in the arrangement of the atoms in their giant structure.
Ceramics and clays that are also made with sand DO have an ordered to the atoms in their giant structures called a matrix. This means they are highly brittle but are excellent heat and electrical resistors. Used in bricks and crockery.

Polymers : hydrocarbon chains that include all plastics

Poly(ethene) can be made into two types of plastic due to the way it is manufactured:

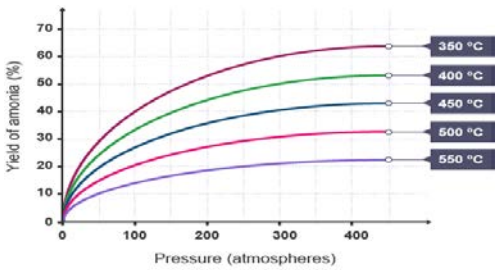
LDPE : low density	Very high pressure. The polymer chains form fast and randomly creating lots of side chains called branches. This prevents the individual poly chains packing together closely. Used for carrier bags and wire insulation as it bends
HDPE : high density	Lower pressure and a catalyst. The polymer chains form much more regular lines that pack closer together. A stronger, heavier polymer is formed. Used in pipes and plastic plates.

All polymers fall into one of two categories

Thermo softening	Remoulded easily with heat because the polymer chains are not connected and have weak intermolecular forces between them. Great for recycling. Used for bottles.
Thermo setting	The polymer chains are covalently bonded together to form a much bigger lattice that cannot melt. Cannot be recycled but does provide strength. Used where the plastic will get hot: hairdryers, engines & remains strong.

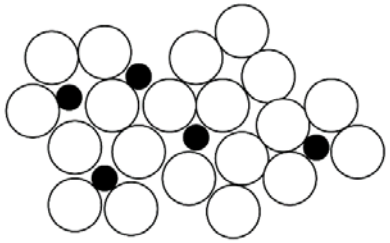
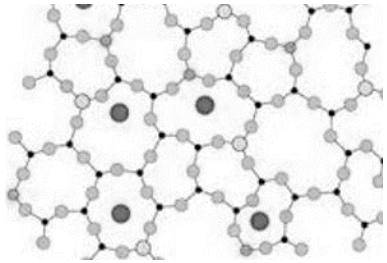
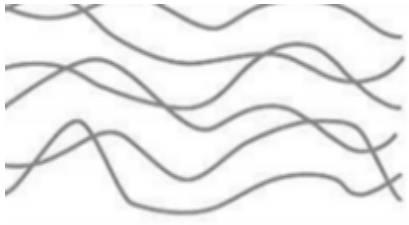
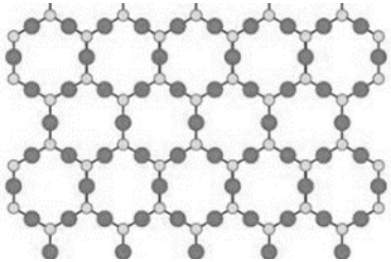
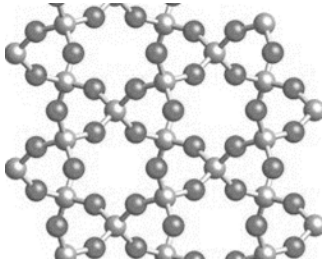
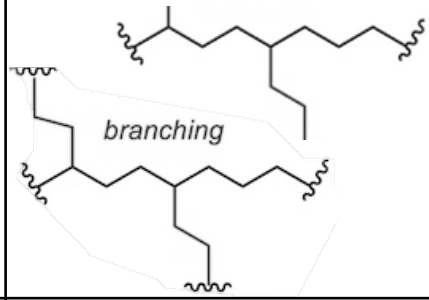
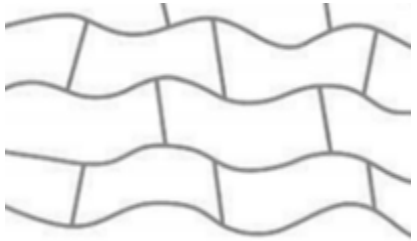
Haber Process : production of ammonia

Raw materials	Nitrogen collected by cooling air (until it becomes liquid) & hydrogen from the electrolysis of water.
Conditions	450°C, 200 atmospheres of pressure, iron catalyst (speeds up both forward and backwards reactions equally). Mixture cooled to remove ammonia. Unreacted H_2/N_2 are recycled.
Reversible	The reaction is reversible, so changing the conditions changes how much ammonia is made:
Increase pressure	Makes more ammonia
Increase temp.	Makes less ammonia because the reaction is exothermic, so by adding heat, the reaction will go in the endothermic direction and make N_2 and H_2



NPK fertilisers refer to the elements in the fertiliser. Ammonia is added to a range of acids to make ammonium compounds:

Ammonium nitrate	Ammonia + nitric acid
Potassium phosphate	Phosphate rock is insoluble, so is dissolved in nitric acid to form a salt that is soluble

			
Alloy	Borosilicate (No order)	HDPE	Thermosoftening
			
Ceramic (matrix)	Silica (No order)	LDPE	Thermosetting