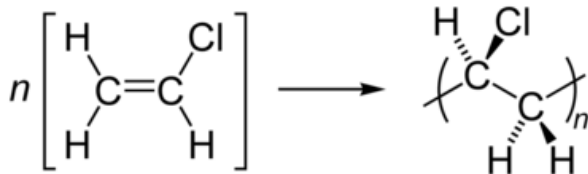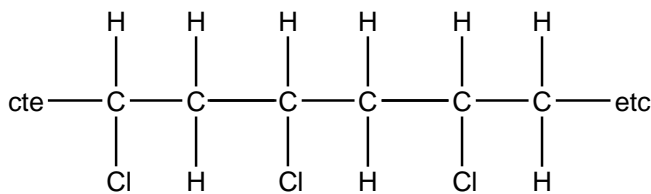# Plastics and Composites

Plastics

1.   What is a plastic?

It's a material with a high molecular mass formed by repeating a simpler unit called a monomer.

Example:

Clarify the above and show what PVC (poly vinyl chloride= used in plumbing pipes) looks like at the molecular level.)

2. Types of Plastics   There are two types of plastics: thermoplastics and thermosetting polymers.

A-Thermoplastics are the plastics that do not undergo chemical change in their composition when heated and can be molded repeatedly

Examples :

polyethylene, polypropylene, polystyrene, polyvinyl chloride and polytetrafluoroethylene (PTFE).

Recycling codes

1. PET *(PETE)*, polyethylene terephthalate(hard plastic containers and ovenware)
2. HDPE, high-density polyethylene(folding chairs, milk jugs)
3. PVC, polyvinyl chloride(plumbing pipes, vinyl records)
4. LDPE, low-density polyethylene(garbage, grocery bags, wash bottles)
5. PP, polypropylene(tic tac covers, LHA chairs)
6. PS, polystyrene(plastic dishes, egg boxes)

Plastics and Composites

PETE   2   V   LDPE   PP   PS   OTHER

B- <u>Thermosets</u> can melt and take shape just once; after they have solidified, they remain in the solid state.
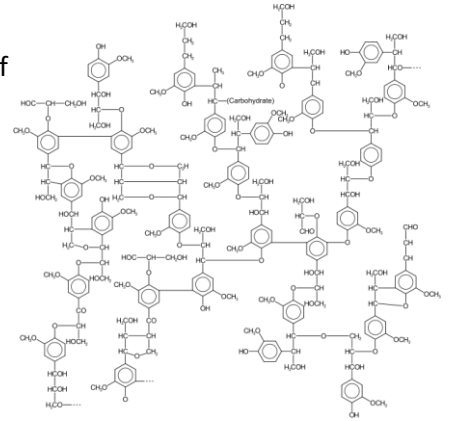
Examples: melamine and Bakelite

3- **What's a Composite**? A composite is a material formed by combining two types of materials. There's a matrix which gives it its shape and a reinforcing material.

Example 1: Why is wood considered a composite? What reinforces the matrix of lignin?
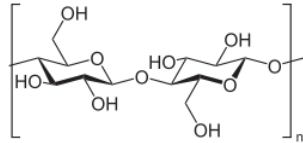

Lignin = matrix

Cellulose(fiber) reinforces the matrix

Example 2: Plastic can be used as a matrix and can be reinforced with fiberglass. The composite is then strong enough to be used in airplanes. Modern planes use other polymers (such as epoxy resins)with carbon fibers. Expensive bicycles do the same. What is the matrix and what is the reinforcement in carbon fiber composites?
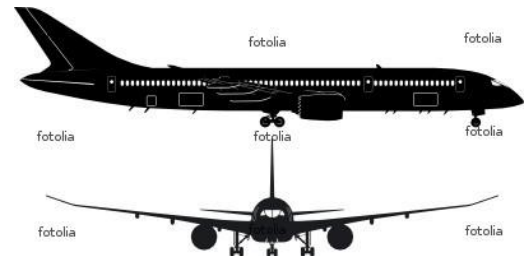
Carbon fiber = reinforcer
Epoxy resin = matrix