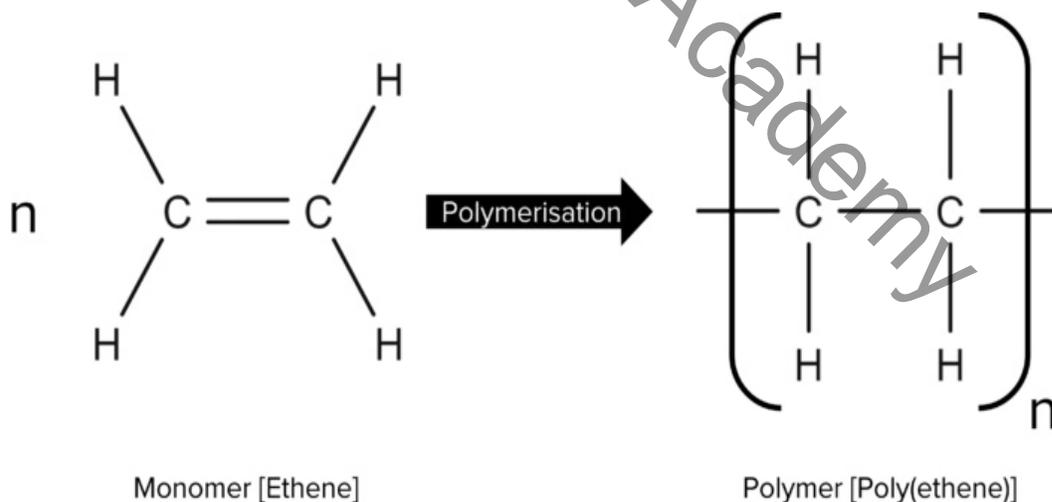
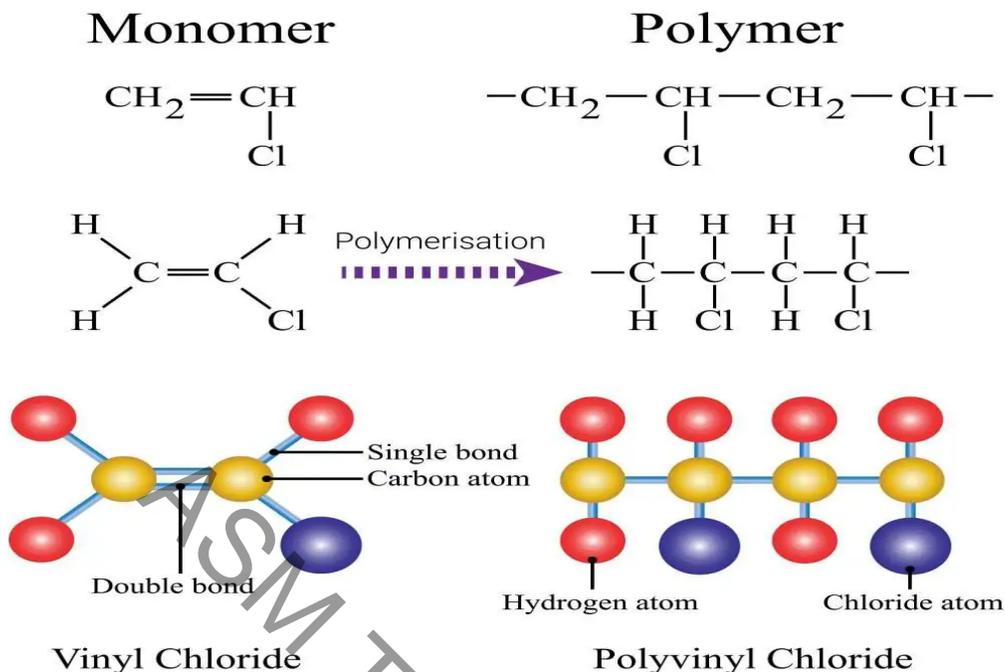


Addition Polymer

- **Polymers** are large molecules with high relative formula masses. They form when smaller molecules, called monomers, are linked together through covalent bonds. Each monomer in a polymer is a repeat unit.
- **Types of polymers**
 1. **Synthetic polymers** are manufactured. To produce synthetic polymers, a catalyst and high pressures are needed. Some examples of synthetic polymers include nylon, plastics and polyester.
 2. **Biological polymers** are produced naturally.
- As alkenes are unsaturated, they can be used to make polymers through a process called **polymerisation**.
- In this type of reaction, the double bond between the carbons in the monomer opens up, allowing it to link with other monomers. The polymer formed is called an **addition polymer**.
- **For example**, ethene molecules can link together in a polymerisation reaction. In this case, the addition polymer formed is poly(ethene).



- Other **addition polymers** can also be produced using monomers containing C=C bonds, including poly(propene), poly(chloroethene) (PVC), and poly(tetrafluoroethene) (PTFE).
- **For example**, poly(chloroethene) or PVC is formed by linking together chloroethene monomers through polymerisation reactions. The image below illustrates this process:



Representing Addition Polymers

When representing addition polymers, it can be difficult to show the entire molecule due to its large size. Instead, repeat units are drawn to represent their structure and formula. To write a repeat unit, follow these steps:

1. Change the double bond in the monomer to a single bond in the repeat unit (C-C instead of C=C).
2. Add a bond to each end of the repeat unit and extend them beyond the bracket.
3. On the right of the bracket, indicate the number of repeating units with a subscript **n**.



Properties of Polymers

The table below shows some examples of polymers, and their properties and uses.

Polymer	Properties	Uses
Poly(ethene)	Flexible, inexpensive and can be made into thin films.	Carrier bags, shampoo bottles and food wrap.
Poly(propene)	Flexible, strong and shatter-resistant	Buckets, bowls, crates, ropes and carpets
Poly(chloroethene)	Tough electrical insulator and can be made hard/flexible.	Insulation for electrical wires, windows, gutters and pipes.
Poly(tetrafluoroethene)	Slippery and chemically unreactive.	Non-stick coatings for pans and containers for laboratory substances.