

# Edexcel IGCSE Chemistry

## Topic 4: Organic chemistry

### Synthetic polymers

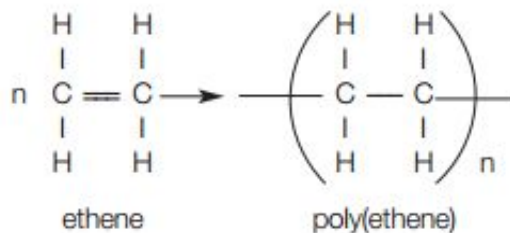
#### Notes





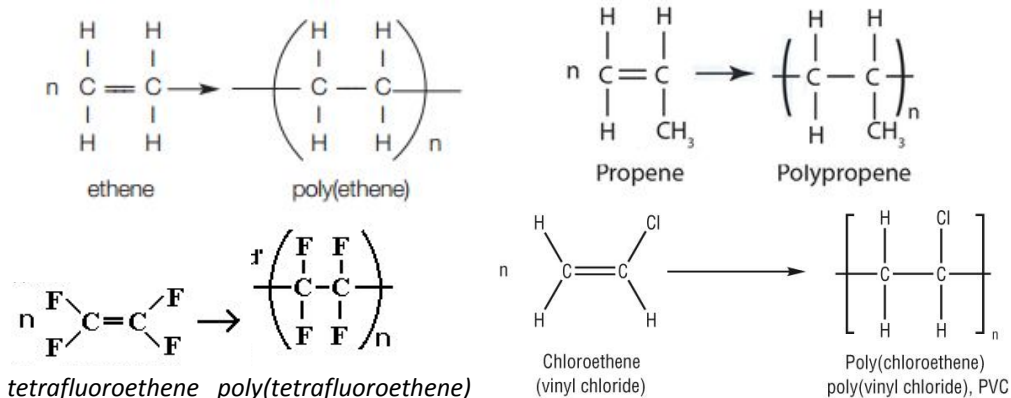
4.44 know that an addition polymer is formed by joining up many small molecules called monomers

- Alkenes can be used to make polymers such as poly(ethane) and poly(propene) by addition polymerisation. In this reaction, many small molecules (monomers) join together to create very large molecules (polymers). For example:



- The repeat unit has the same atoms as the monomer because no other molecule is formed in the reaction

4.45 understand how to draw the repeat unit of an addition polymer, including poly(ethene), poly(propene), poly(chloroethene) and (poly)tetrafluoroethene



4.46 understand how to deduce the structure of a monomer from the repeat unit of an addition polymer and vice versa

- Monomer is just repeat unit, replacing C-C with C=C and removing brackets and "n"



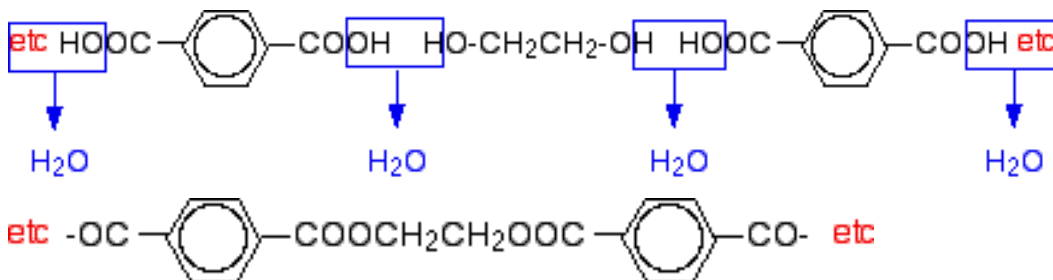


**4.47 explain problems in the disposal of addition polymers, including:**

- Unable to biodegrade, because they are inert / unable to react therefore, microorganisms and bacteria are unable to break them down
- The production of toxic gases when they are burned
- Carbon dioxide is released when burnt– which adds to global warming

**4.48 (chemistry only) know that condensation polymerisation, in which a dicarboxylic acid reacts with a diol, produces a polyester and water**

- In condensation polymerisation, a small molecule is formed as a by-product each time a bond is formed between two monomers
- diol- molecule with 2 alcohol OH functional groups
- dicarboxylic acid- molecule with 2 carboxylic acid COOH functional groups
- When you react a diol and a dicarboxylic acid, the alcohol and carboxylic acid functional groups react, losing a small molecule – water
- This is an ester – therefore a polyester is a lot of these monomers (esters)
  - the dicarboxylic acid loses the OH group off of each COOH group
  - the di-alcohol loses the H off of each OH group
  - the remaining molecules join together to make a polyester
  - the H and OH join to form water



**4.49 (chemistry only) understand how to write the structural and displayed formula of a polyester, showing the repeat unit given the formulae of the monomers from which it is formed including the reaction of ethanedioic acid and ethanediol**

- similar to polymers
- from the monomers, identify the OH (from carboxylic acids) and H (from alcohols) that will be lost and join up the molecules at these points
- the repeat unit is simply one of each diol and dicarboxylic acid joined together, with a bond sticking out at each end (the same as for polymers)



4.50 (chemistry only) know that some polyesters, known as biopolyesters, are biodegradable

- Biopolyesters are biodegradable, making them easier to dispose of than other polyesters

