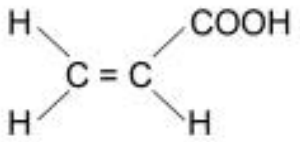
**Question 31** **(7 marks)**

Polyacrylic acid is a polymer that is formed from the monomer propenoic acid (also known as acrylic acid). The monomer propenoic acid is shown below.

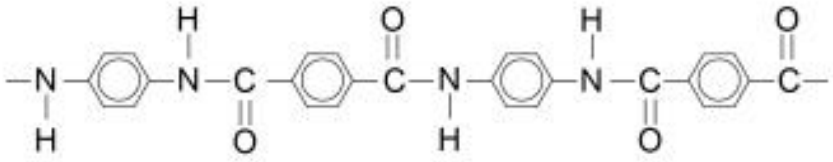



(a) Draw the structure of the polymer polyacrylic acid showing at least **three** repeating units. (2 marks)

When reacted with sodium hydroxide, polyacrylic acid becomes polyacrylate. Polyacrylate is a powder that swells when water is added and can absorb up to 180 times its weight in water. It is used for applications such as disposable nappies.

(b) A child's nappy contains approximately 3.97 g of polyacrylate, and a particular company state that their nappies are at least 97.4% efficient at absorbing water. After thorough testing it was demonstrated that this brand of nappies could absorb 691 g of water. Use a calculation to determine whether the claims of the company that manufacture the nappies are true. (3 marks)

Kevlar is a polymer that is formed through a condensation reaction that releases water during the polymerisation of its monomers. A section of the Kevlar polymer is shown below.



(c) Draw the structure of the **two** monomers from which Kevlar is made. (2 marks)

Monomer 1

Monomer 2