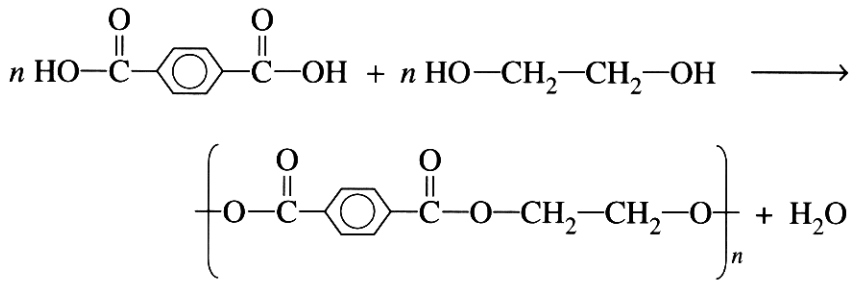
Marks

Question 18 (6 marks)

(a) Name the type of polymerisation shown in the following reaction: **1**



condensation polymerisation

(b) Assess current developments in the use of biopolymers. **5**

With fossil fuel supplies dwindling, researchers have tried to find alternatives to petroleum derivatives to make such things as plastics. Cellulose possesses the basic carbon chain structure needed to manufacture materials for the petrochemical industry and its advantage is that it's renewable and biodegradeable hence better for the environment.

An example of a biopolymer being developed is polyhydroxyalkanoates (PHAs) which can be produced by the bacteria Alcaligenes eutrophus

This plastic is similar → to poly(propene)

These bacteria are grown in fermentation vats and feed on molasses and methanol. Plastic is extracted by breaking down the cell wall and separating it from the cell debris. A development is that researchers are currently growing plants from which this plastic can also be extracted, from the cell walls.

Another biopolymer making an impact on society is rayon produced from the cellulose in wood pulp. It is first softened with NaOH and carbon disulfide to break it down, then extruded through a spinneret into a solution of sulfuric acid. The rayon is then spun into fibres. A new one step process uses zinc chloride to break down cellulose and form complexes, the advantage being the raw material is waste which is cheaper than wood pulp.

Developments in biopolymers are decreasing our reliance on fossil fuels hence creating plastics that are renewable and environmentally friendly releasing less pollutants. (biodegradeable).