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**Question 30** (8 marks)

- (a) Compare the process of polymerisation of ethylene and glucose. Include relevant chemical equations in your answer. 3

• Polymerisation of ethylene is known as addition. The double bond provides a free radical.

• Polymerisation of glucose is known as condensation. This is because it produces a water molecule.

$$C_2H_4 + C_2H_4 \rightarrow C_4H_8$$
$$C_6H_{12}O_6 + C_6H_{12}O_6 \rightarrow C_{12}H_{22}O_{11} + H_2O$$

This is the addition of two monomers.  
The chain would continue in this fashion.

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Question 30 (continued)

- (b) Explain the relationship between the structures and properties of THREE different polymers from ethylene and glucose, and their uses. 5

- Poly styrene made from the addition of a benzene ring to ethylene so has a low density. Because of the large branching benzene ring.
- Cellulose made from the polymerisation of glucose has a large solid structure due to the ring polymer. Due to this it is rigid and strong.
- Poly vinyl chloride is made from ethylene with a chlorine added in substitution like the benzene. It has a high density and little branching so it is strong and rigid.

End of Question 30