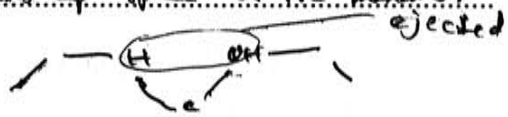
Question 30 (8 marks)

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

The polymerisation of ethylene is addition polymerisation, where the double bond in ethylene between the carbon atoms opens to link other carbon atoms from other monomers.

$n(C_2H_4) \rightarrow -[CH_2CH_2]-_n$

The polymerisation of glucose is condensation polymerisation, where for the two monomers to combine a water molecule has to be ejected, made up from Hydrogen and oxygen from the two monomers. This opens up space for the monomers to join.



Question 30 continues on page 22

Question 30 (continued)

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

The Two polymers of ethylene are High Density Polyethylene (HDPE) and Low Density Polyethylene (LDPE). In LDPE the chains of ethylene are messy, and cannot get close together, meaning a lower density polymer which is flexible, making it useful in items like zip-lock bags and cling-wrap. HDPE is combined using Ziegler-Natta catalysts at temperatures of 60° and pressure of 2 atmospheres. This gives the ethylene chains a smoother structure allowing them to sit closer, and giving a high density polymer which is hard and relatively rigid, making it useful in chopboards and tupperware containers.

End of Question 30