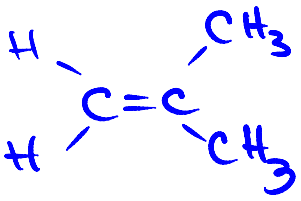
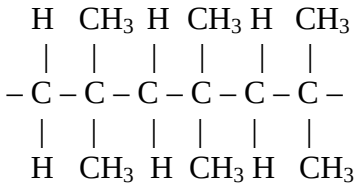


3.091 Fall Term 2004

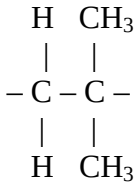
Homework Quiz #12A

solution outline

(a) Isobutylene, shown above to the left, can be reacted by addition polymerization to form polyisobutylene. Draw a segment of polyisobutylene showing three repeat units.



(b) What is the degree of polymerization, *n*, of polyisobutylene that has a molecular weight of 3.091×10^5 g/mol?

the mer unit is  which has a molecular weight of

$(4 \times 12 \text{ for C}) + (8 \times 1 \text{ for H}) = 56$ g/mol

$\therefore n = 3.091 \times 10^5 \text{ g/mol} / 56 \text{ g/mol} = 5520$

(c) Is polyisobutylene a thermoset or a thermoplastic? Explain.

Polyisobutylene is a thermoplastic. It is a linear chain molecule. Only weak van der Waals bonds hold the solid together. Raising the temperature will loosen these bonds and allow the chains to flow without damage to the covalently bonded primary structure.