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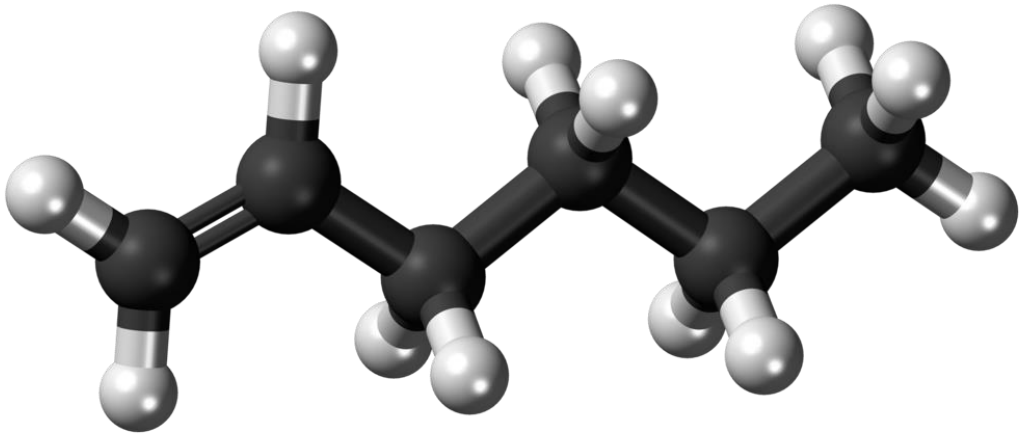
Understanding Hexene (C6) Grade PE



Reference of Aldo Quaratino from Matrix Polymers, UK

Objectives

- Describe what a co-monomer is
- Describe the differences between the most popular co-monomers such as Butene and Hexene
- Describe how a co-monomer can influence the mechanical and physical properties of a roto-mouldable polyethylene grade

Reference of Aldo Quaratino from Matrix Polymers, UK

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Co-monomers

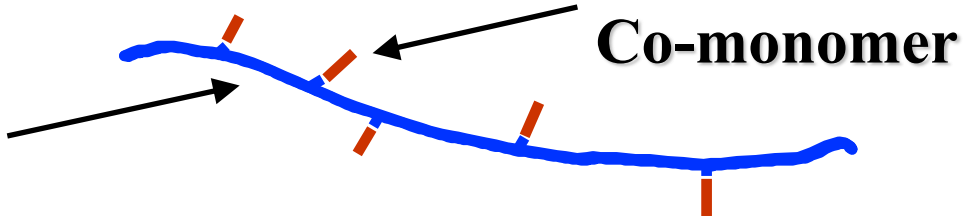
- Monomers are small molecules which may be joined together in a repeating fashion to form more complex molecules called polymers (e.g. Polyethylene)
  - They are the building blocks for PE
- In PE the monomer is Ethylene (ie - two Carbon atoms)
  - C-C
- A co-monomer is itself a monomer where the number of Carbon atoms is greater than two
  - Four Carbons
  - Six Carbons
  - Eight Carbons

Reference of Aldo Quaratino from Matrix Polymers, UK

Co-monomers in PE

- The co-monomers are added to PE during the phase of the polymerisation process
- The co-monomers are added to PE to modify the mechanical and physical properties of PE
- The co-monomers create branches on the PE backbone

- PE backbone



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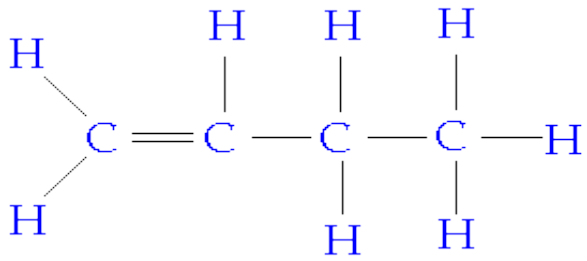
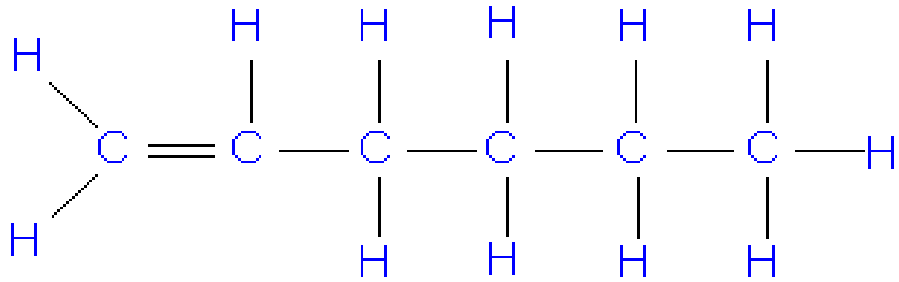
Butene vs. Hexene



C-4



C-6

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Descriptions

- 2 Carbon atoms is called ETHYLENE C2
- 4 Carbon atoms is called BUTENE C4
- 6 Carbon atoms is called HEXENE C6

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Properties – C4 vs. C6

- Impact resistance of Hexene based PE is normally greater than Butene based PE
- Hexene grades are tougher than Butene PE grades
- Hexene grades can be more ductile than Butene PE grades

Reference of Aldo Quaratino from Matrix Polymers, UK

Long term properties – C4 vs. C6

- Environmental Stress Cracking Resistance (ESCR) is enhanced for Hexene PE grades in comparison to Butene PE grades.
- Resistance to CREEP and FATIGUE are improved for Hexene PE grades
- Hexene PE grades offer better chemical resistance than Butene PE grades, this is due to the high number of tie molecules and entanglement

Reference of Aldo Quaratino from Matrix Polymers, UK