What Is A Plastic (Polymer)?

A polymer is a macromolecule composed of many repeated subunits (monomers).

Plastics are organic polymers that are easily molded or shaped while soft and then set into a rigid or slightly elastic form.

All plastics are polymers, but not all polymers are plastics!

[Diagram showing polymerization of ethylene to form polyethylene]
Bakelite - The First Synthetic Plastic

polyoxybenzylmethylenglycolanhydride
Thermoplastics do not cure/set when heated. These substances may be reheated and reformed. Cross-linking does not occur.

Thermosets crosslink under the application of heat (bonding between chains). This is an irreversible process.
# Types of Plastics

<table>
<thead>
<tr>
<th>Name</th>
<th>Common Name</th>
<th>UTS (ksi)</th>
<th>Glass (°C)</th>
<th>Melting (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyethylene terephthalate</td>
<td>Polyester, Mylar, PETE</td>
<td>9.4</td>
<td>75</td>
<td>260</td>
</tr>
<tr>
<td>High-density polyethylene</td>
<td>HDPE</td>
<td>2.9 – 4.6</td>
<td>110</td>
<td>108 – 134</td>
</tr>
<tr>
<td>Polyvinyl chloride</td>
<td>PVC</td>
<td>2.9 – 3.3</td>
<td>50</td>
<td>100 – 260</td>
</tr>
<tr>
<td>Low-Density Polyethylene</td>
<td>LDPE</td>
<td>1.1 – 1.7</td>
<td>110</td>
<td></td>
</tr>
<tr>
<td>Polypropylene</td>
<td>PP</td>
<td>3.6 – 4.3</td>
<td>10</td>
<td>160-165</td>
</tr>
<tr>
<td>Polystyrene</td>
<td>PS</td>
<td>4.6 – 8.7</td>
<td>85</td>
<td>240</td>
</tr>
<tr>
<td>Polycarbonate</td>
<td>Lexan, PC</td>
<td>8.0 – 10.0</td>
<td>150</td>
<td>256</td>
</tr>
</tbody>
</table>
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<tbody>
<tr>
<td>Polymethyl methacrylate</td>
<td>PMMA, Acrylic</td>
<td>~7</td>
<td>105</td>
<td>135</td>
</tr>
<tr>
<td>Polyoxymethylene</td>
<td>POM, Acetal, Delrin</td>
<td>~9</td>
<td>125</td>
<td>175</td>
</tr>
<tr>
<td>Acrylonitrile Butadiene Styrene</td>
<td>ABS</td>
<td>~5.3</td>
<td>110</td>
<td>250</td>
</tr>
<tr>
<td>Polytetrafluoroethylene</td>
<td>PTFE</td>
<td>~2.1</td>
<td>65</td>
<td>325</td>
</tr>
<tr>
<td>Polyamide</td>
<td>Nylon</td>
<td>~7.2</td>
<td>50</td>
<td>255</td>
</tr>
<tr>
<td>Polyetheretherketone</td>
<td>PEEK</td>
<td>~16</td>
<td>160</td>
<td>340</td>
</tr>
<tr>
<td>Polyetherimide</td>
<td>Ultem</td>
<td>~16.5</td>
<td>216</td>
<td>290</td>
</tr>
</tbody>
</table>
Compression Molding

Compression Mold - OPEN

Compression Mold - CLOSED
Compression Molding
Transfer Molding

![Diagram of Transfer Molding Process]

- **Transfer Molding**
- **Sprue**
- **Raw Material**
- **Ram**
- **Transfer Pot**
- **Tear Trim Beads**
- **Mold Cavity**
- **Flash Pad**
- **Ram**
- **Transfer Pot**
- **Molded Rubber Part**

**Transfer Mold - Open**

**Transfer Mold - Closed**
Transfer Molding
Injection Molding
Injection Molding
Injection Molding
Foam Molding
Overmolding
Thermoforming
Thermoforming
Rotational Molding
Blow Molding
Blow Molding

Parison Extrusion (Cross-section) | Blow Molding (Cross-section) | Part Formed

Air hose | Die head | Mold
Extruder | Molten plastic | Blow pin
Cooling lines | Mold cavity | Blow pin
Parison | Mold half | Molded part
Mold half | Molded part | Molded part

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Blow Molding