

## Polythene: Teacher Notes

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The video clip shows the manufacture of low density poly(ethene) (LDPE). The high density (HDPE) product is made using lower pressure and a Ziegler–Natta catalyst. High density poly(ethene) is less branched than the low density form and has a higher melting temperature and a greater tensile strength.

### Nomenclature

Systematic names are not used on the plant. Ethene is usually called ethylene and poly(ethene) is referred to as polyethylene, not polythene.

### Naphtha

Naphtha is a product obtained from the fractional distillation of crude oil. It consists mainly of alkanes of chain lengths from C<sub>5</sub> to C<sub>9</sub> and also some cycloalkanes and aromatic compounds.

### Compressing the ethene

Compressing the ethene heats it up to about 100 °C and it is then cooled to around 30 °C before it enters the reactor. This is because the polymerisation reaction is exothermic and without cooling, the reaction could overheat. The temperature of the emerging polythene/ethene mixture must not exceed about 280 °C or the properties of the polymer will be affected.

### The initiators

These are organic peroxides such as benzoyl peroxide (C<sub>6</sub>H<sub>5</sub>CO)<sub>2</sub>O<sub>2</sub> whose O–O bond breaks homolytically, producing free radicals which initiate the polymerisation reaction.

### Packaging the polythene granules

It is interesting to note that the polythene granules are packed in sacks which are also made of polythene. So it is not necessary to empty the sacks to melt and remould the plastic; both sack and contents can be used.