Cracking and crude oil essay sample

Science, Chemistry

Explain the use of crude oil as a source of both aliphatic and aromatic hydrocarbons

Crude oil: a complex mixture of hydrocarbons found in layers of rock beneath the earth’s surface Aliphatic Hydrocarbons: contain chains of carbon atoms that may be branched Aromatic Hydrocarbons: contain Benzene rings- rings of carbon atoms with delocalized electrons Alkanes all have different boiling points dependent on the length of the carbon chain in the molecule. The smaller chains ie. the most volatile hydrocarbons will leave at the top of the column as gases because they have the lowest boiling points. Within each fraction there is also a mixture of hydrocarbons, the chain length isn’t the same. This is due to branched chains having different boiling points to straight chains

Suggest how cracking can be used to obtain more useful alkanes and alkenes of lower Mr from larger hydrocarbon molecules

The breaking up or large hydrocarbon chains into smaller molecules for alternative uses. Cracking produces a mixture containing mainly alkanes, alkenes or hydrogen. Alkenes are industrially useful molecules and smaller alkanes are used in fuels such as petrol.

Thermal Cracking: high temperatures (typically in the range of 450°C to 750°C) and pressures (up to about 70 atmospheres) are used to break the large hydrocarbons into smaller ones. Thermal cracking gives mixtures of products containing high proportions of hydrocarbons with double bonds – alkenes.

Catalytic Cracking: The alkane is brought into contact with the zeolite catalyst at a temperature of about 500°C and moderately low pressures. The zeolites used in catalytic cracking are chosen to give high percentages of hydrocarbons with between 5 and 10 carbon atoms – particularly useful for petrol (gasoline). It also produces high proportions of branched alkanes and aromatic hydrocarbons like benzene.

An example of how C15H32 may react and break up to form smaller hydrocarbons

The hydrocarbon molecules are broken up in a fairly random way to produce mixtures of smaller hydrocarbons, some of which have carbon-carbon double bonds.