



Our Students. Our Passion

HSC CHEMISTRY

PRODUCTION OF MATERIALS

1. Fossil fuels provide both energy and raw materials such as ethylene, for the production of other substances.

Identify the industrial source of ethylene from the cracking of some of the fractions from the refining of petroleum

What does 'identify' in the syllabus require in this dot point?

Syllabus points clearly identified

Exam strategy taught to maximise marks in answering exam questions

What is cracking?

- involves the process in which high molecular weight (ie. high bp) fractions from crude oil are broken into lower molecular weight (low bp) substances in order to increase the output of high demand products

There are 2 types of cracking methods

Catalytic cracking	Steam or thermal cracking
<p>Process:</p> <p>how is catalytic cracking done? the fractions are heated with a catalyst (zeolite).</p> <p>why use zeolite? The zeolite catalyst has very ordered structures with tunnels & cavities throughout so has a large surface area. It works by absorbing the substance to increase the surface area available to be heated, hence lowering the activation energy</p> <p>by products are: ethene & propene</p> <p>overall products: alkanes of shorter chain lengths & small alkenes</p>	<p>Process:</p> <ul style="list-style-type: none">Using ethane from low value petroleum fractions, it is mixed with half its weight in steam.It is then passed through a very hot metal tube where the bonds in the molecules of the fractions are broken by the heat, resulting in smaller molecules.It is the high temperature that causes much of the ethane to be converted into ethene
<p>Purpose of this method:</p> <p>to increase the output of high demand products such as petrol</p>	<p>Purpose of this method:</p> <p>To produce ethene & propene to produce polymers</p>

Clear, easy to understand format



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Identify data, plan and perform a 1st hand investigation to compare the reactivities of appropriate alkenes with the corresponding alkanes in bromine water

Describe the method by which you compared the reactivities of an alkane and an alkene in bromine water (**typical HSC question usually worth about 2-3marks)

1. Retrieve 2 equal sized test tubes
2. In one test tube add 5mL of cyclohexene, in another add 5 mL of cyclohexane
3. Add 10 drops of bromine water in each test tube
4. Gently shake each test tube and observe the colour changes

How to obtain full marks by answering questions in dot points.

For any 'plan and perform' investigations you do during the HSC you may be expected to not just *describe* the method by also *justify* the method. Therefore you must know why certain method, reactants, equipment etc are used

Method, reactant, equipment	Why this was used in the 'bromine water' experiment
Cyclohexane & cyclohexene	They differ only by a double bond so enables us to solely test for the effect of double bond on reactivity such that other variables do not influence the results. Also they are the only few liquid alkanes and alkenes and are easier to handle than gas.
Bromine water	Used because it will readily react with a double bond but not a single bond. The reaction is also observable in the form of a colour change.
Why perform in a fume cupboard?	The substances are added in a fume cupboard because it is volatile and poisonous
Why do all variables need to be controlled for the bromine test with cyclohexane AND cyclohexene?	All variables (eg. temperature, volume) were held constant between the alkene & alkane for validity of results

Experiments explained in detail



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Identify instruments & processes that can be used to detect radiation

Although this is an 'identify' dot point, in the exam frequently you are required to not just identify but also 'describe' briefly how these instruments and processes work. Therefore we will 'describe' rather than 'identify'

Photographic film	degree of darkening of film increases with length of exposure and intensity of radiation
Geiger-Muller tube	based on the property that radiation causes matter to be ionised, forming positive ions and free electrons. The gaseous cations and electrons produced by the ionising radiation are attracted to electrodes that conduct a current to a recording device
Scintillation counter	based on the property that some substances such as zinc sulfide produce a flash of light when struck by ionising radiation

**** some markers emphasize the differences between PROCESS v INSTRUMENT- photographic film is considered a process and NOT an instrument**

Exam hints given from experienced tutors