C7 Organic Chemistry – Crude Oil, Alkanes and Alkenes

**Facts**

**Carbon compounds as fuels:**

* Crude oil is running out. It is the remains of ancient biomass formed mostly from buried plankton in mud.
* Crude oil is mostly made of large numbers of hydrocarbons (hydrogen and carbon atoms only).
* Most of the hydrocarbons in crude oil are alkanes.
* The general formula for alkanes is CnH2n+2
* The first 4 alkanes are methane, ethane, propane and butane.
* Hydrocarbons in crude oil can be separated into fractions containing similar numbers of carbon atoms using fractional distillation.
* Petrol, diesel, oil, kerosene, heavy fuel oil and liquefied petroleum are produced from crude oil.
* Lubricants, polymers and detergents used in modern life are produced by the petrochemical industry.
* The size of the hydrocarbons can affect their properties e.g.
  + Boiling point
  + Viscosity
  + Flammability
* The combustion of hydrocarbons releases energy
* During combustion, the carbon and hydrogen are oxidised to produce carbon dioxide and water (complete combustion).
* Hydrocarbons can be cracked (broken down) to produce smaller, more useful molecules.
* Cracking can be done by catalytic cracking and steam cracking.
* The products of cracking are alkanes and alkenes. There is high demand for fuels with small molecules and so some of the products of cracking are used as fuels.
* Alkenes are more reactive than alkanes. You can test for alkenes using bromine water as they react with it.
* Alkenes are used to make polymers and as starting materials for the production of many other chemicals.

**Reactions of alkenes:**

* Alkenes are hydrocarbons with a double carbon-carbon bond.
* The general formula for alkenes is CnH2n
* The first 4 alkenes are ethene, propene, butene and pentene
* Alkenes react with oxygen in combustion reactions but they tend to burn in air with smoky flames due to incomplete combustion.
* Alkenes react by adding atoms across the carbon-carbon double bond to become a carbon-carbon single bond.
* Alkenes react with hydrogen in the presence of a catalyst to produce the corresponding alkane.
* Alkenes react with water (steam) in the presence of a catalyst to produce alcohol
* Alkenes react with halogens to produce a saturated compound with 2 halogen atoms in the molecule e.g. ethene + bromine 🡪 dibromoethane
* Alkenes can be used to make polymers such as poly(ethene) and poly(propene) by addition polymerisation.

**Task 1: Watch Free Science lessons (if you can) and do a mind map of the information**

[**GCSE Science Chemistry (9-1) Crude oil and hydrocarbons**](https://www.youtube.com/watch?v=CX2IYWggEBc&list=PL9IouNCPbCxVDcgWiviYYWj0xKMPXTd8s)

[**GCSE Science Chemistry (9-1) Properties of hydrocarbons**](https://www.youtube.com/watch?v=4EAh9E2KhOE&list=PL9IouNCPbCxVDcgWiviYYWj0xKMPXTd8s)

**GCSE Science Chemistry (9-1) Combustion of hydrocarbons**

**GCSE Science Chemistry (9-1) Fractional Distillation of Crude Oil**

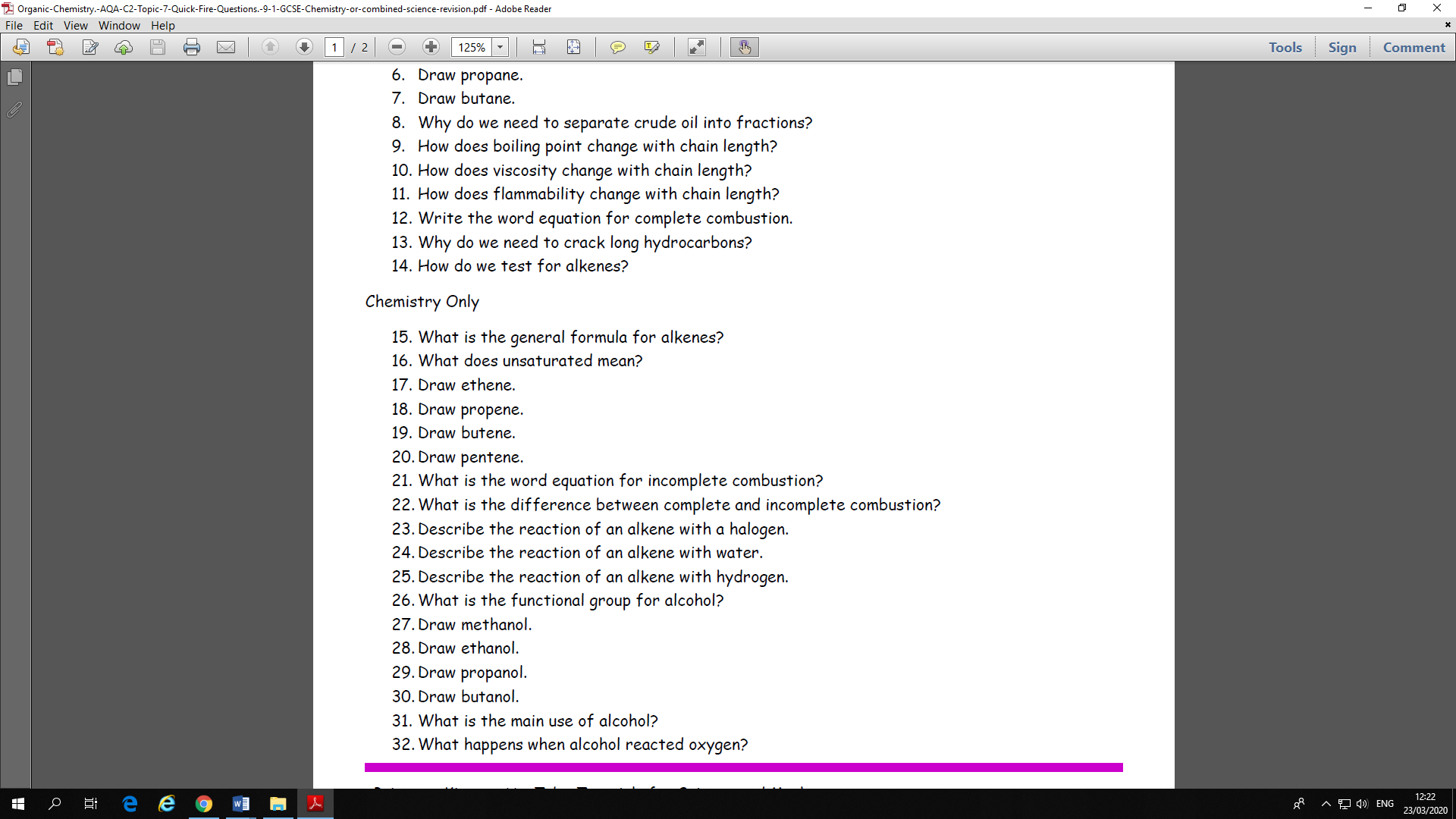
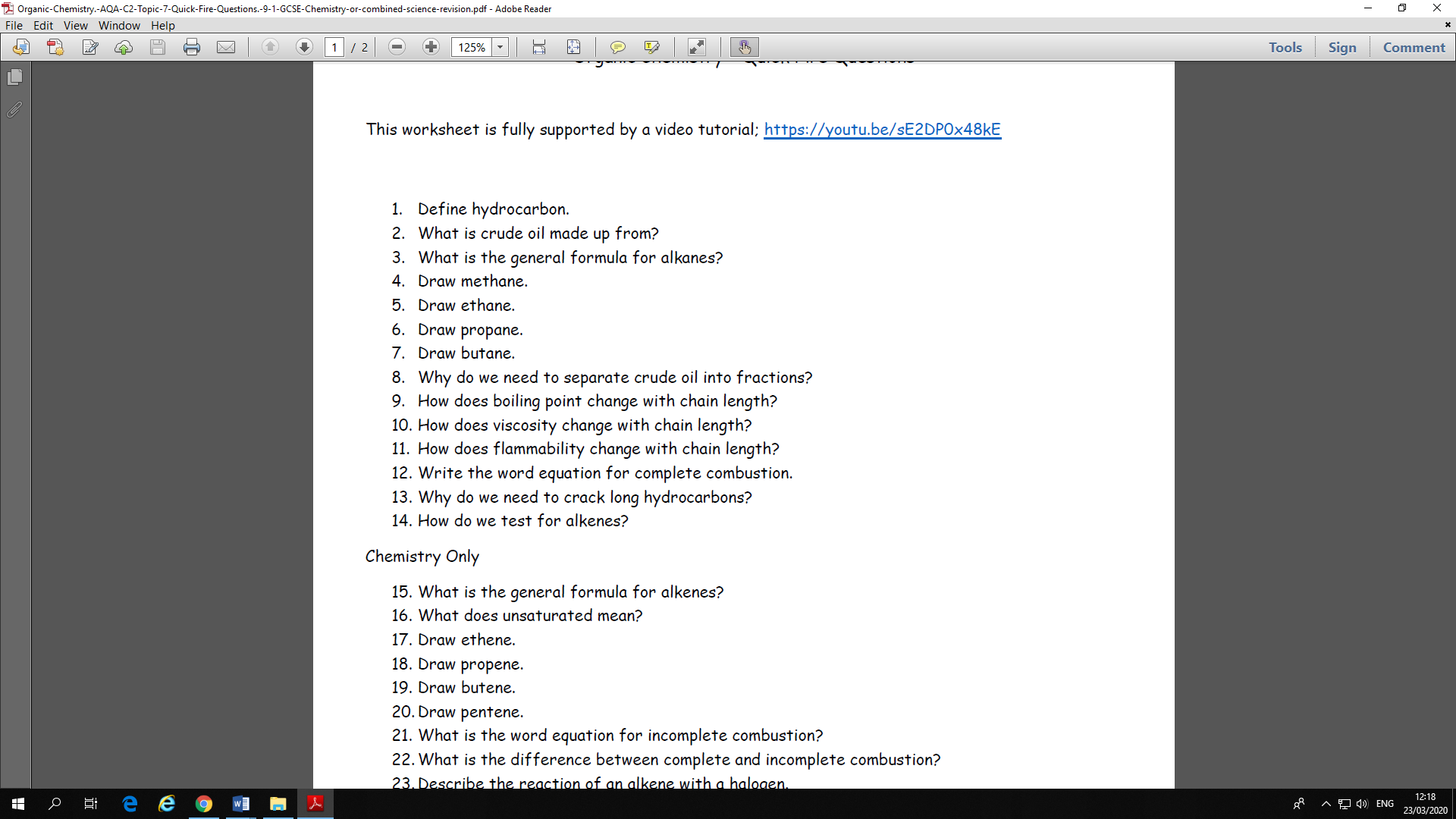
**GCSE Science Chemistry (9-1) Cracking**

**GCSE Science Chemistry (9-1 Triple) Alkenes**

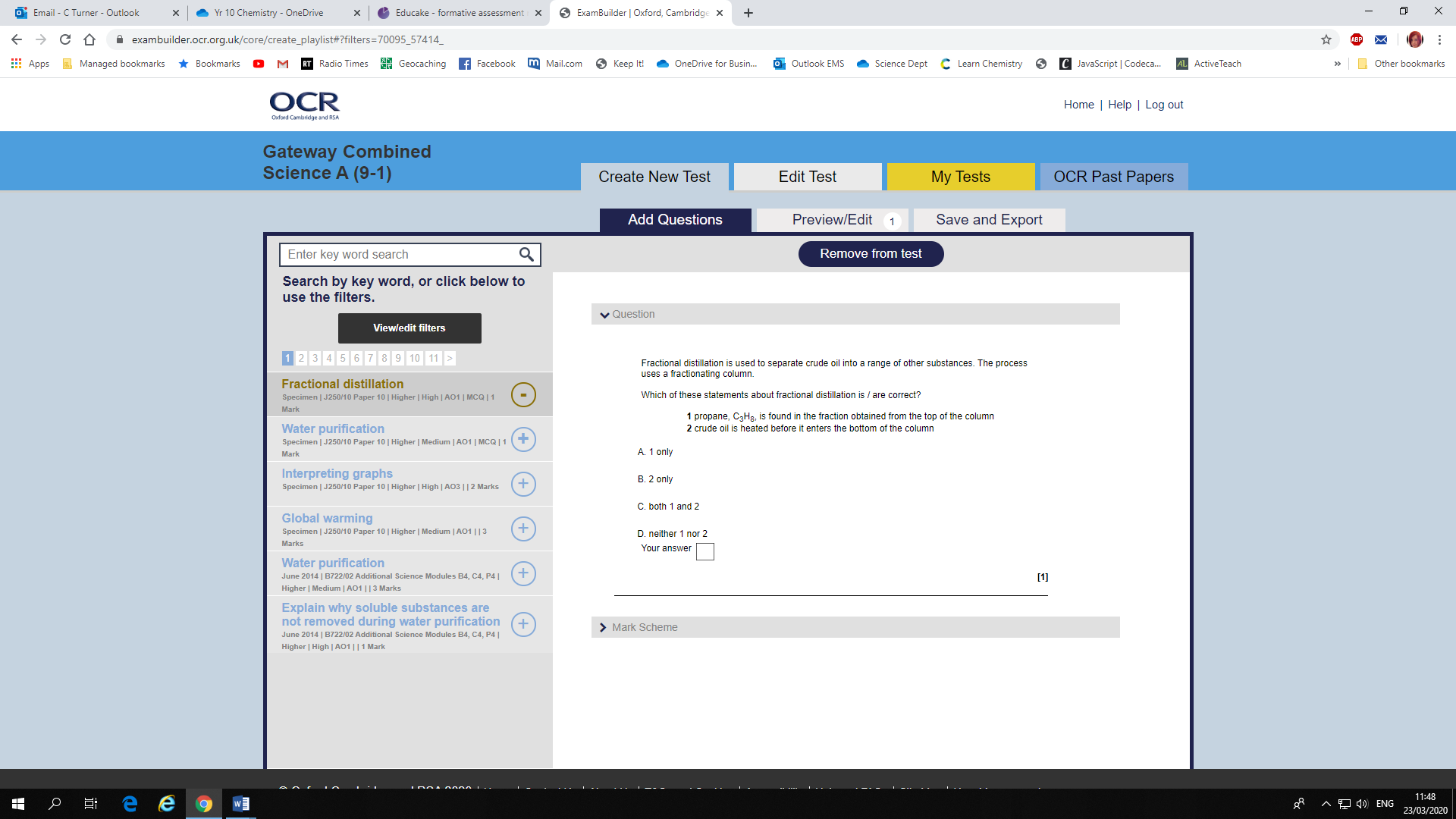
**GCSE Science Chemistry (9-1 Triple) Reactions of Alkenes 1**

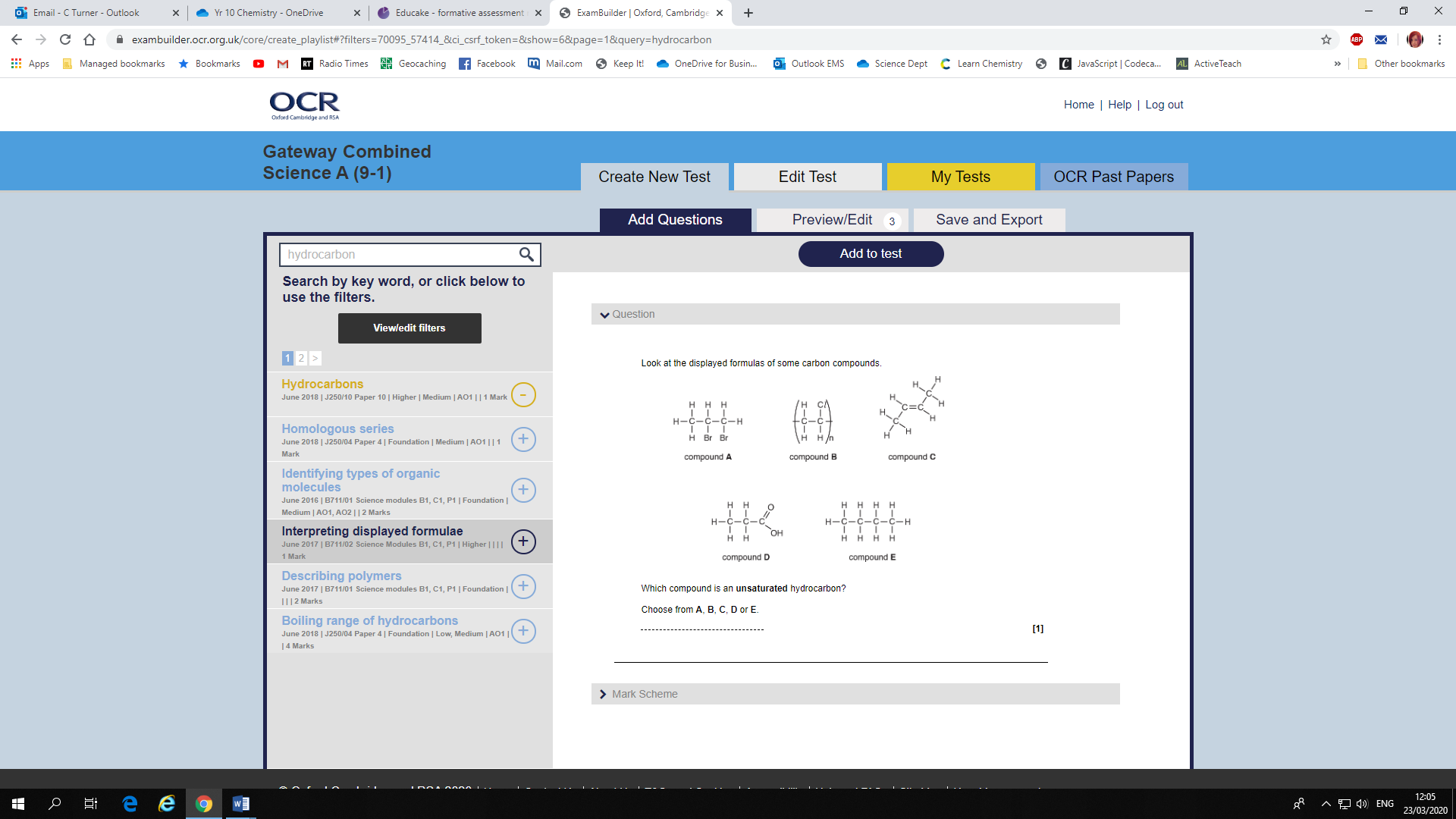
**GCSE Science Chemistry (9-1 Triple) Reactions of Alkenes 2**

**Task 2: Test yourself! Answer these quick fire questions.**

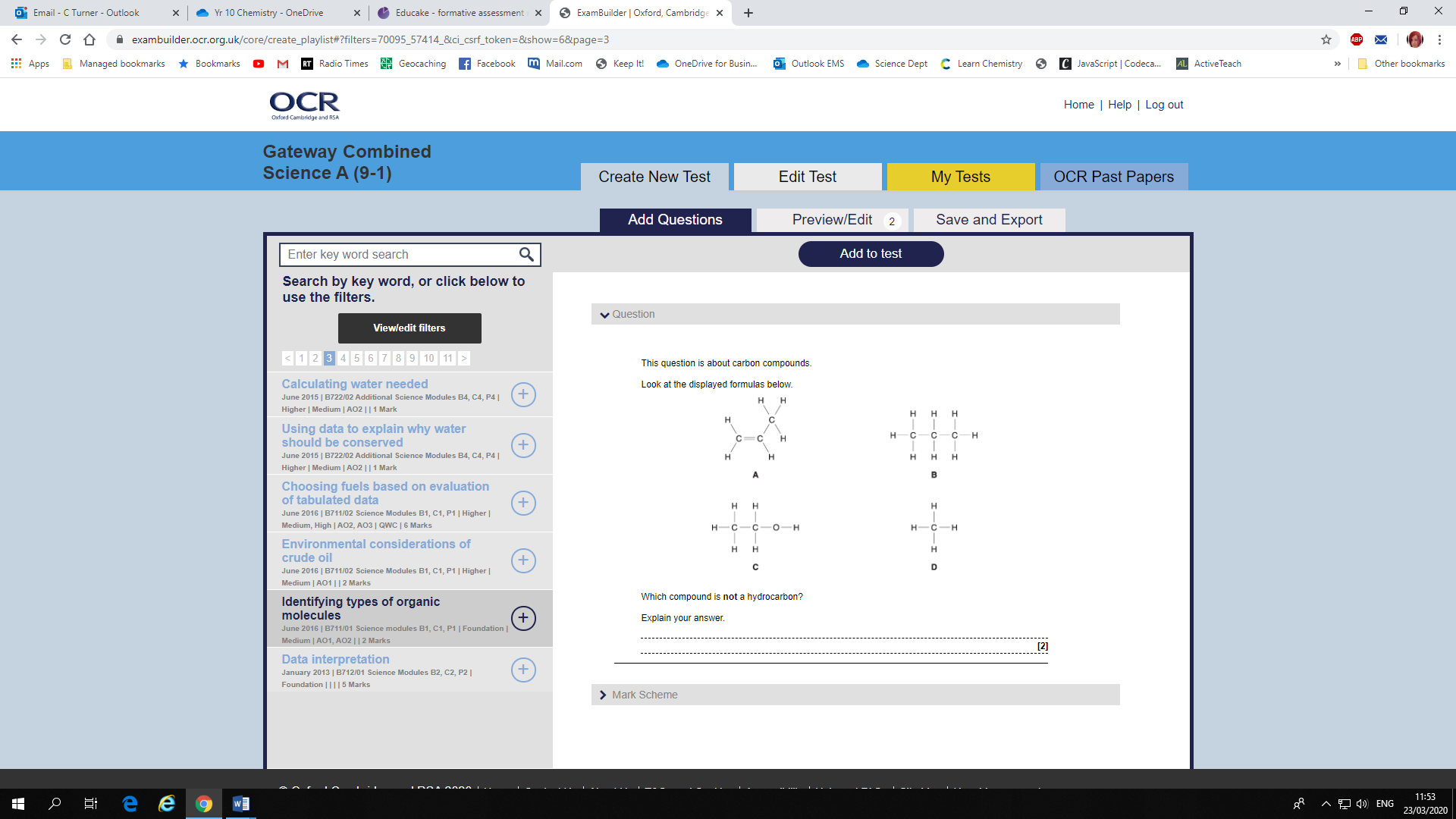


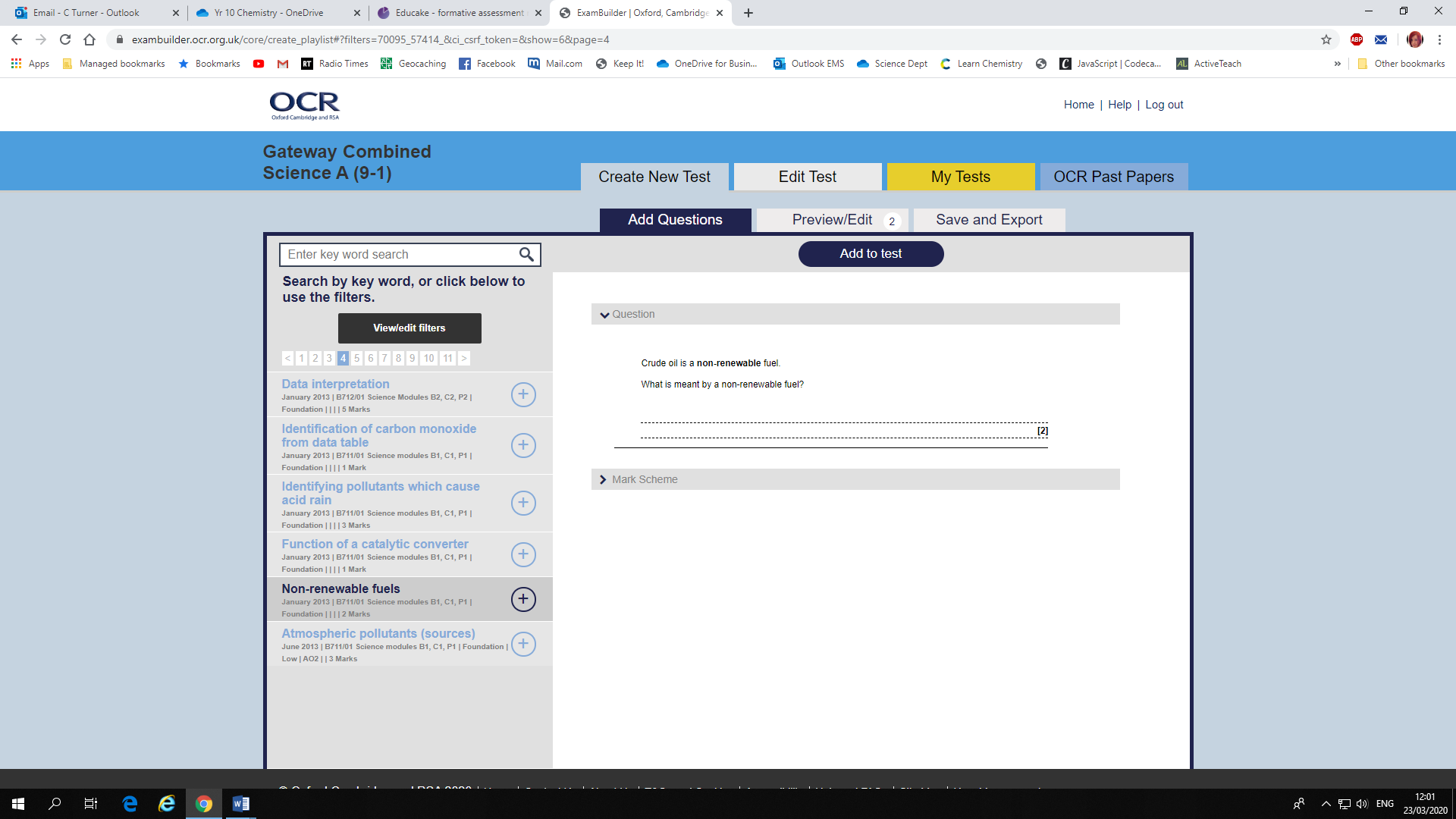
**Task 3: Answer these Multiple Choice Questions**

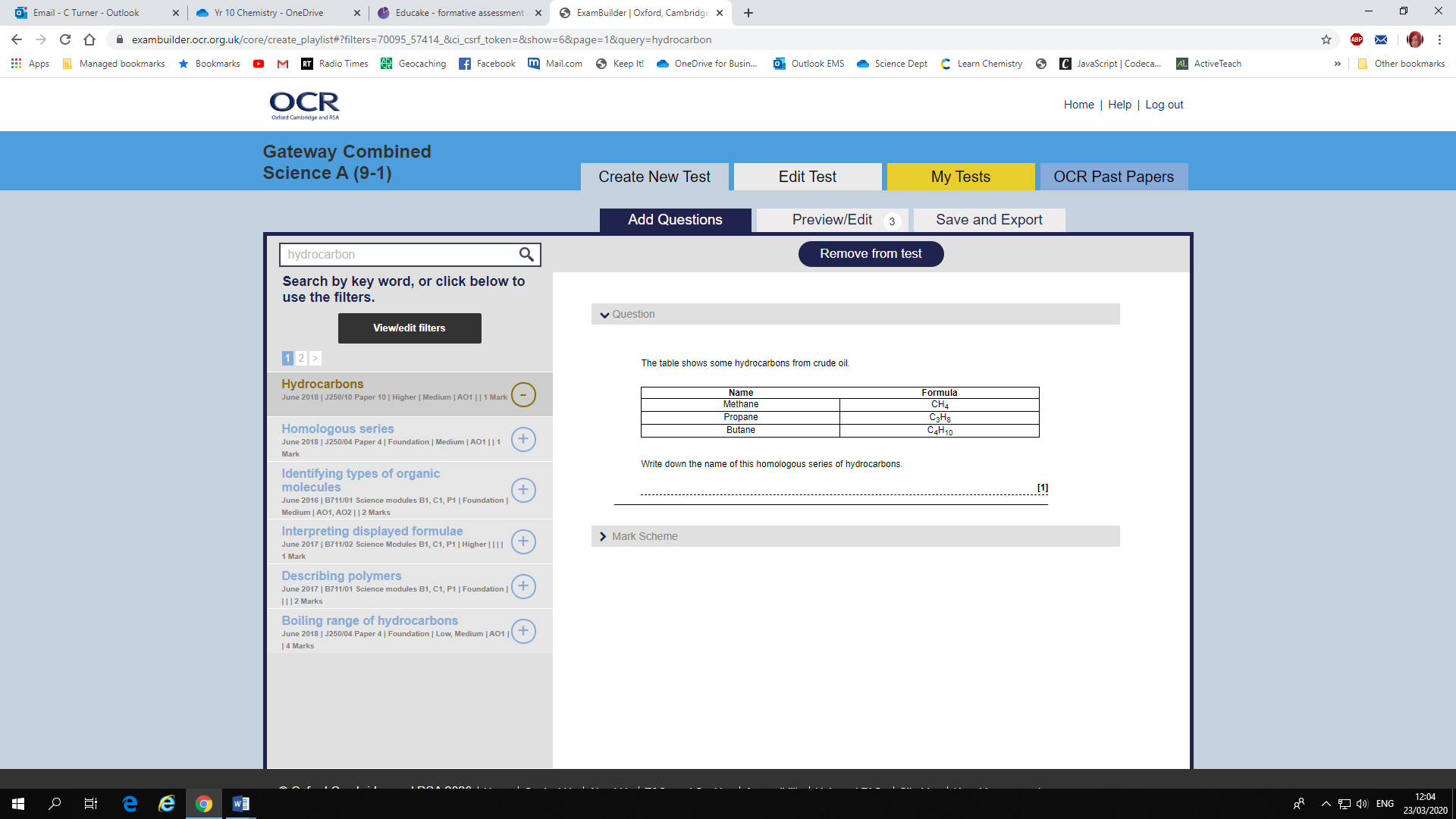




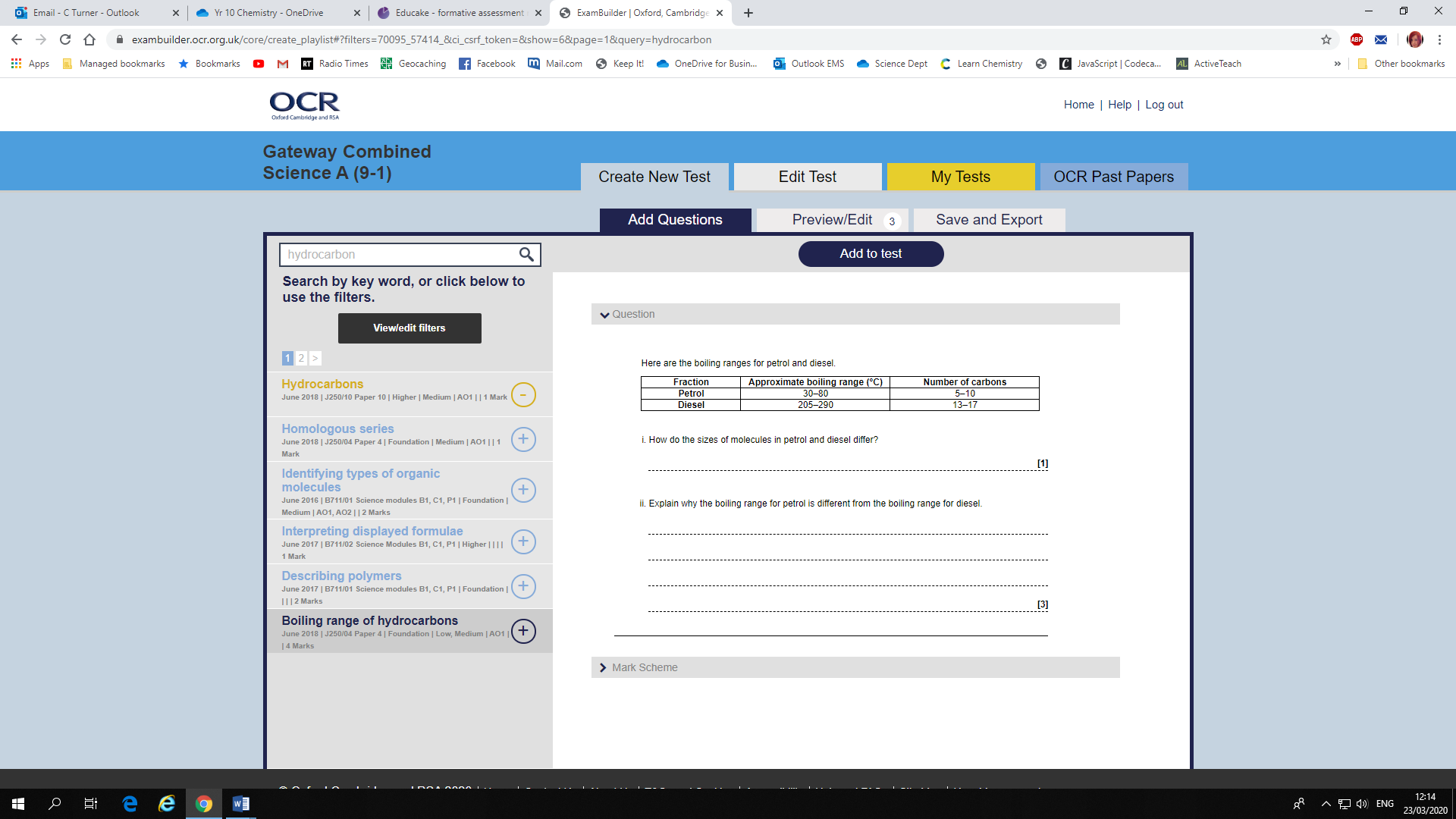
**Task 4: Answer these Shorter Answer Questions**

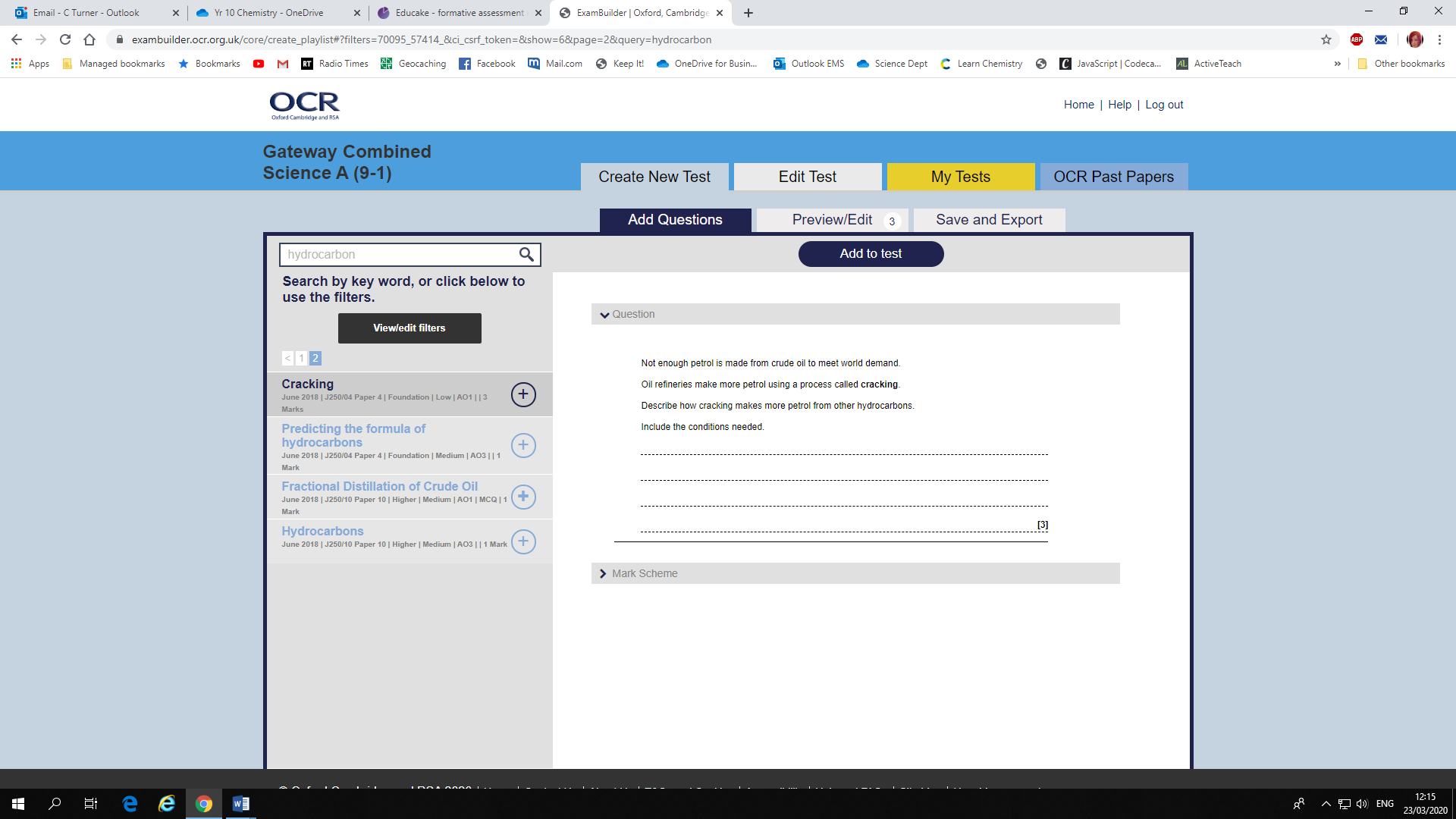






**Task 5: Answer these Longer Answer Questions**





**Task 6: Researching uses of alkanes and alkenes**

Find out some uses of alkanes and alkenes. **Describe** how alkenes are produced from crude oil and **explain** why this is necessary. **Describe** how alkenes used to make polymers and **name** some uses of polymers.