| Question | Answers | Extra information | Mark | AO / Spec Ref. |
| --- | --- | --- | --- | --- |
| **01** | gases at room temperature ─ small moleculeshigh boiling point ─ large moleculeslow viscosity ─ small moleculesvery flammable ─ small molecules | 4 correct  **3** marks;3 correct  **2** marks;2 correct  **1** mark. | 3 | AO1C7.1.3WS1.2, 4.1 |
| **02.1** | exothermic | Accept combustion;allow burning **or** oxidation **or** redox. | 1 | AO1C7.1.3WS1.2, 4.1 |
| **02.1** | Carbon monoxide/CO (is produced);because there is incomplete/partial combustion (of the fuel). | Allow monoxide (is produced) but ignore carbon oxide;accept because there is insufficient oxygen/air (to burn the fuel). | 11 | AO1C7.1.3WS1.2, 4.1 |
| **02.3** | **Level 3:** There is a reasonable explanation of how petrol is, or fractions are, separated from crude oil using evaporating **and** condensing. | 5–6 | AO2C7.1.2WS1.2 |
| **Level 2:** There is some description of heating/evaporating crude oil **and either** fractions have different boiling points **or** there is an indication of a temperature difference in the column. | 3–4 |
| **Level 1:** There is a statement that crude oil is heated **or** that substances are cooled. However there is little detail and any description may be confused or inaccurate. | 1–2 |
| **Level 0:** No relevant content. | 0 |
| **Indicative content:*** some/most of the hydrocarbons (or petrol) evaporate/form vapours or gases
* when some of/a fraction of the hydrocarbons (or petrol) cool to their boiling point they condense
* hydrocarbons (or petrol) that have (relatively) low boiling points are collected near the top of the fractionating column or hydrocarbons with (relatively) high boiling points are collected near the bottom of the fractionating column
* the process is fractional distillation
* heat the crude oil/mixture of hydrocarbons or crude oil/ mixture is heated to about 350 °C
* some of the hydrocarbons remain as liquids
* liquids flow to the bottom of the fractionating column
* vapours/gases rise up the fractionating column
* vapours/gases cool as they rise up the fractionating column
* the condensed fraction (or petrol) separates from the vapours/ gases and flows out through a pipe
* some of the hydrocarbons remain as vapours/gases
* some vapours/gases rise out of the top of the fractionating column
* there is a temperature gradient in the fractionating column/the fractionating column is cool at the top and hot at the bottom.

This indicative content is not exhaustive, other creditworthy responses should be awarded marks as appropriate. |
| **03.1** | CnH2n+2 |  | 1 | AO1C7.1.1 |
| **03.2** | C13H28 |  | 1 | AO2C7.1.1MS3b, c |
| **03.3** | *Layout Disk 1:01_Q2A Media:OUP:GCSE Kerboodle Worksheets:Design HO 02/07:z_Source:830885 AQA GCSE Science Kerboodle HO 6 Jan 2017:06 02 17:Priority 1:Priority 1 PNGs:AQA Chemistry Exam-style questions:oxo_AQA16_C9ss_xm01_awfg01.png* |  | 1 | AO2C7.1.1 |
| **03.4** | Five points plotted correctly;six points plotted correctly;smooth curved line of best fit. | ± half a square;allow straight line. | 111 | AO3C7.1.3WS1.2, 4.1MS4c |
| **03.5** | 98 (°C) | ±1 °C | 1 | AO3C7.1.3WS1.2, 4.1MS4a |
| **03.6** | range −35 to −50 (°C) |  | 1 | AO3C7.1.3WS1.2, 4.1MS4a |
| **04.1** | cracking | Allow thermal decomposition. | 1 | AO1C7.1.4WS1.2 |
| **04.2** | remains orange/no change/no reaction | Allow ‘nothing’/remains yellow/brown. | 1 | AO1C7.1.4 |
| **04.3** | Decolourised/orange to colourless;contains alkenes/double bonds/ is unsaturated. | Do **not** allow ‘clear’;allow yellow/brown to colourless. | 11 | AO1C7.1.4 |
| **04.4** | B;B is a gas/has lower boiling point **or**A is a liquid/has higher boiling point. | Allow B has weaker forces between its molecules.**or**A has stronger forces between its molecules. | 11 | AO1C7.1.3WS1.2, 4.1 |
| **04.5** | C12H26 → C6H14  **3**C2H4 | allow multiples e.g. 2, 2, 6 | 1 | AO2C7.1.4 |
| **04.6** | Any **three** from:* large molecules less useful
* large molecules in less demand
* small molecules are feedstocks/ used to make polymers
* small molecules are better fuels/ burn cleaner/burn more easily.
 | Allow converse;allow converse;allow converse. | 3 | AO2C7.1.4WS1.2 |