AQA GCSE Chemistry

Practice answers

Question	Answers	Extra information	Mark	AO / Specification reference
01.1	top = ethane bottom = butane		1 1	AO1 4.7.1.1
01.2	$C_{22}H_{46}$		1	AO2 4.7.1.1
01.3	decane has a lower flammability, higher boiling point, and higher viscosity		1	AO1 4.7.1.3
02.1	Points plotted at (5,36) (6,69) (7, 98) (8, 126) (10, 174) (11, 196) (12, 216)	two marks for all eight points correctly plotted one mark for four to seven points correctly plotted one mark for line of best fit	3	AO2
02.2	153	allow number between 151 and 155	1	AO3

02.3	$C_9H_{20} + 14O_2 \rightarrow 9CO_2 + 10H_2O$	one mark for correct formula of nonane one mark for formulae of reactants one mark for formulae of products one mark for balancing	4	AO2 4.1.1.1
03.1	compounds in crude oil with a similar number of carbon atoms		1	AO1 4.7.1.2
03.2	vapour moves up the column, cooling as moving up fractions condense when they reach the temperature of their boiling points different fractions collected at different levels		1 1 1	AO1 4.7.1.2
03.2	**Level 3:** The comparisons are detailed and accurate. The writing is clear, coherent and logical and comparisons are clearly made.		5-6	AO1 4.7.1.3
	Level 2: The comparisons are generally correct, although may lack detail. The writing is mainly clear, although the structure may lack logic and comparisons are not always clear.		3-4	
	Level 1: Some comparisons are correct. The writing lacks clarity, coherence and logic, and the comparisons are not clearly expressed.		1-2	
	No relevant content		0	

	Indicative content • both burn (completely) to make carbon dioxide and water • on burning, both release energy/transfer energy to the surroundings • diesel boils at higher temperatures than petrol • diesel is more viscous than petrol • diesel is less flammable than petrol • diesel is more likely to have smoker/ more sooty flame			
04.1	so that the liquid hydrocarbon forms vapour		1	AO2 4.7.1.4
04.2	should not be in the liquid collected		1	AO3
04.3	C_5H_{12} boiling point increases with molecule size		1 1	AO2 4.7.1.3
04.4	orange/brown to colourless		1	AO1 4.7.1.4
05.1	B is C_2H_4 – bromine test shows it is an alkene C is $C_{17}H_{36}$ – has highest boiling point so must have the biggest molecules D is C_2H_6 – has lowest boiling point of the alkanes so has smallest molecules A is C_8H_{18} – intermediate boiling point of alkanes, and so intermediate size molecules		1 1 1 1	AO3 4.7.1.3 4.7.1.4
05.2	C		1	AO3 4.7.1.3

05.3	$C_{20}H_{42} \rightarrow C_8H_{18} + 4C_3H_6$	one mark for formulae of reactants one mark for formulae of products one mark for balancing	3	AO2 4.7.1.4
06.1	hydrocarbons		1	AO1 4.7.1.2
06.2	fractional distillation crude oil is vaporised and pumped into column temperature decreases as you go up column groups of hydrocarbons of a similar number of carbon atoms condense at their boiling point the fractions are tapped off		1 1 1 1 1 1	AO1 4.7.1.2
06.3	**one** from • petroleum gas – fuel • petrol – fuel (in engines) • kerosene – fuel (in aircraft) • heavy fuel oil/diesel oil – fuel (diesel engines) • residue/bitumen – making roads	use must match the fraction given fuel on its own is an acceptable answer for petroleum gas, petrol, kerosene, and heavy fuel oil; however, if a particular machine is named it must match the correct fraction	1	AO1 4.7.1.2
07.1	crude oil		1	AO1 4.7.1.1

07.2	$(6 \times 12) + (14 \times 1) = 86$		1	AO2 4.3.1.2
07.3	**Level 3:** The pattern is described correctly and the explanation is accurate. The writing is clear and coherent and the reasoning is logical.		5-6	AO1 x 2 AO3 x 4
	Level 2: The pattern is correctly described, and the explanation mainly accurate. The writing is mainly clear and coherent, but the reasoning lacks logic.		3-4	
	Level 1: The pattern is described correctly. The writing lacks clarity and coherence. The reasoning is unclear.		1-2	
	No relevant content.		0	
	Indicative content • alkanes consist of small molecules with weak intermolecular forces between the molecules • boiling point decreases as intermolecular force strength decreases • data in the table show that as the number of branches increases, boiling point decreases • intermolecular bond strength decreases as branching increases			
08.1	both require heat in catalytic cracking, the vapour is passed over a hot catalyst in steam cracking, the vapour is mixed with steam before heating		1 1 1	AO1 4.7.1.4
08.2	$C_{10}H_{22} \rightarrow C_6H_{14} + 2C_2H_4$		1	AO2 4.1.1.1
08.3	to make more smaller alkane molecules for fuels to make alkenes to produce polymers/other chemicals		1 1	AO1 4.7.1.4

09.1	$C_5H_{12} + 8O_2 \rightarrow 5CO_2 + 6H_2O$	one mark for formulae of reactants one mark for formulae of products one mark for balancing	3	AO2 4.1.1.1
09.2	per mole of C_5H_{12} complete combustion requires 8 moles of oxygen but incomplete combustion requires $\frac{11}{2}$ = 5.5 moles of oxygen so incomplete combustion occurs when there is not enough oxygen for complete combustion		1 1	AO3 4.7.1.3
09.3	energy to break bonds in reactants = (2 × 348) + (8 × 412) + (5 × 496) = 6472 (kJ) energy to make bonds in products = (6 × 743) + (8 × 463) = 8162 (kJ) energy change of reaction = 8162 - 6472 = 1690 (kJ)	ignore units	1 1 1 1 1	AO1 4.5.1.3
10.1	positive – bubbles of gas/swimming pool smell/green gas formed negative – small drops of silver-coloured metal		1 1	AO2 4.4.3.2
10.2	$Zn^{2+} + 2e^- \rightarrow Zn$	one mark for formulae of reactants one mark for formulae of products one mark for balancing	3	AO2 4.4.3.5

10.3	positive – chlorine negative – hydrogen		1 1	AO2 4.4.3.4
11.1	reversible	allow description of reversible reaction	1	AO1 4.6.2.1
11.2	cooling (the mixture of ammonia and hydrogen chloride)		1	AO2 4.6.2.2
11.3	prevents the escape of reactants and products		1	AO1 4.6.2.3
12.1	remains of ancient biomass/plankton that was buried in the mud		1	AO1 4.7.1.1
12.2	evaporation condensation		1 1	AO1 4.7.1.2
12.3	**Level 3:** A range of products and their uses are described. The writing is clear and coherent.		5-6	AO1 4.7.1.2
	Level 2: Some products and/or their uses are described. The writing is mainly clear and coherent.		3-4	
	Level 1: One or two products/uses are described. The writing lacks clarity and coherence.		1-2	
	No relevant content.		0	

	Indicative content • fuels, for example diesel, petrol, kerosene, liquefied petroleum gases • raw materials for solvents • raw materials for lubricants • raw materials for polymers • raw materials for detergents			
13.1	covalent bonds shared pairs of electrons between neighbouring atoms		1 1	AO1 4.2.1.4
13.2	intermolecular		1	AO1 4.2.2.4
13.3	$C_7H_{16} + 11O_2 \rightarrow 7CO_2 + 8H_2O$ M_r of heptane = (7 × 12) + (1 × 16) = 100 85.0 g of heptane = $\frac{85.0}{100}$ = 0.850 mol from the equation, one mole of heptane makes seven moles of carbon dioxide so 0.850 mol of heptane makes 0.850 × 7 = 5.95 mol of CO_2 M_r of carbon dioxide = 12 + (16 × 2) = 44 so mass of carbon dioxide = 5.95 × 44 = 262 g = 260 g		1 1 1 1 1 1 1	AO2