GCSE Chemistry only

Higher

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
01.1	$\frac{(15.9 + 17.6 + 16.1)}{2}$ 16.53 (°C)		1 1	AO3 C7.2.3 MS2b
01.2	17.5 (°C)		1	AO3 C7.2.3
01.3	add a lid/insulation/move flame closer		1	AO3 C7.2.3 AT1, 5
01.4	more moles of carbon dioxide		1	AO1 C7.2.3
02	**Level 3 (5–6 marks):** There is a reasonably detailed description of both method. and a comparison of how ethanol is produced from sugar **and** by hydration.		6	AO1×4 AO2×2 C7.2.2 C7.2.3 WS1.2
	Level 2 (3–4 marks): There is a description of both methods. There is an attempt to compare the production of ethanol from sugar and by hydration.			
	Level 1 (1–2 marks): There is a basic description of one method. Little or no attempt at comparison of the two methods of producing ethanol.			
	Level 0 (0 marks): No relevant content.			
	Indicative content: **Hydration:** • ethene named • water/steam • high temperature/300 °C • high pressure/60–70 atmospheres • (phosphoric acid) catalyst • equation • only ethanol produced • 100% atom economy • continuous/fast/pure. **Sugar:** • sugar named • aqueous solution/water • yeast • warm/25–50 °C			

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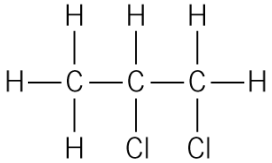
	• anaerobic • equation • carbon dioxide also produced • lower atom economy • batch/slow/impure. **Comparison** • hydration has 100% atom economy • sugar has lower atom economy • hydration is continuous • hydration is fast/pure • sugar is not continuous / completed in batches • sugar is slow / impure			
03.1	$CH_3CH_2CH_2COO^-$ H^+		1 1	AO2 C7.2.4
03.2	sodium propanoate		1	AO2 C7.2.4
03.3	CH_3CH_2COONa		1	AO2 C7.2.4
03.4	bubbles of gas / carbon dioxide is given off		1	AO2 C1.1.1
03.5	ethanoic acid methanol		1 1	AO3 C7.2.4
04.1	contains a double or triple (carbon–carbon) bond		1	AO1 C7.2.1 WS1.2
04.2		accept Cl in any position on carbon-2 and carbon-3	1	AO2 C7.2.2
04.3	C_3H_8		1	AO2 C7.2.2 WS1.2
04.4	chlorine – room temperature hydrogen – (nickel or other) catalyst hydrogen – high(er) temperature / 60 to 150 °C		1 1 1	AO1 C7.2.2 WS1.2

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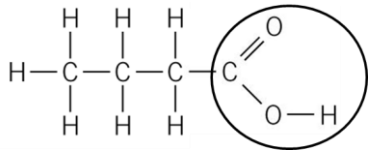
05.1			1	AO2 C7.2.4
05.2	butanoic acid is a weak/weaker acid because it does not fully ionise	allow because it does not fully dissociate allow converse for sulfuric acid	1 1	AO1 AO2 C7.2.4
05.3	carbon dioxide		1	AO1 C7.2.4
05.4	slower/fewer bubbles for butanoic acid lower concentration of hydrogen ions	allow converse for sulfuric acid	1 1	AO1 C7.2.2 AT5, 6