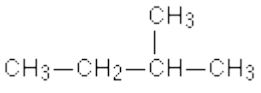
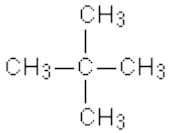
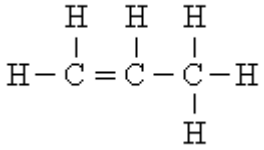
Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
6	1	(a)	(i)		3	SO_2 O_2 (1) SO_3 (1) formulae must be correct to get balancing mark 2, 1, 2 (1)			
			(ii)		2	30 (2) if incorrect answer credit (1) for two correct readings from graph i.e. 86 and 56			
			(iii)		2	H_2SO_4 (1) [no mark for SO_3] $H_2S_2O_7$ (1)			
		(b)			3	black mass forms / black solid forms / sugar turns black (1) steam / water vapour / hissing (1) smell (1) any two for (1) each carbon (1)		temperature rise / water formed / bubbles / fizzing	

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
7	2	(a)			2	100 × 4.2 × 30 (1) 12600 (1) award (2) for cao			
		(b)			1	same height between flame and can same can/same wick/ same spirit burner same stirring (or not) not using a lid for all alcohols changing the water each time / using cold water each time any one for (1)		same room temperature / conditions	
		(c)			3	theoretical values greater (than experimental values) (1) both values increase down alcohol group (1) loss of heat to the surroundings / can (1)	rank order the same		
		(d)			2	two linked points required e.g. biofuels have a lower energy output than traditional fuels (1) and therefore require greater quantities to be consumed (in order to produce the same amount of energy) (1) credit sensible alternatives uses land that would otherwise be used to grow food crops (1) leading to food shortage/price increase (1) growth requires large amounts of water (1) which is therefore not available for other uses (1)			

Question Number			
FT	HT	Mark	Answer
8	3	6	**Indicative content** **Benefits e.g.** increase crop yield, more food, healthier plants, improves quality of soil, cheaper food and releases land for other purposes. **Problems e.g.** increased soil acidity (which needs neutralising using lime), pollutes water supplies/ nitrates in drinking water (possible health problems), overgrowth of plants in canals (which requires unblocking) and 'eutrophication' or full description – (algae over growth, bloom formation, sunlight blocked, plants die, bacteria removes oxygen during decomposition, water de-oxygenated and water becomes lifeless) **5-6 marks** The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. **3-4 marks** The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. **1-2 marks** The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. **0 marks** The candidate does not make any attempt or give a relevant answer worthy of credit.

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	4				6	three **different** methods needed award max (2) for each method use water (1) remove heat (1) 'beat' (1) remove air/oxygen (1) bulldoze/back burn / backfire / making a firebreak (1) remove fuel (1) method must be correct for second mark to be awarded			CO_2 extinguisher / fire blanket as a method of removing oxygen in this context

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	5	(a)	(i)		1	C_8H_{18}			
			(ii)		2	 (1)  (1)			
		(b)	(i)		1	C_nH_{2n}			
			(ii)		1				
		(c)			1	**B** contains C=C peak both needed for (1)			

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	6	(a)	(i)		1	1000 atmospheres 100 ^{o}C both needed for (1)			
			(ii)		2	low rate/ slow reaction (1) (iron) catalyst (1)	decreased rate		incorrectly named catalyst e.g. V_2O_5
			(iii)		1	cost of container/more expensive to build/thicker container walls/ cost of getting to high pressure		'cost'	
		(b)	(i)		1	exothermic			
			(ii)		1	4 $\longrightarrow$ 4			
			(iii)		2	$CuCO_3 + 2HNO_3 \longrightarrow Cu(NO_3)_2 + H_2O + CO_2$ formulae correct (1) balancing (1) formulae must be correct for balancing mark to be awarded			

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	7	(a)			4	**A** sodium iodide **B** ammonium carbonate **C** calcium chloride **D** iron**(II)** carbonate mark positive and negative ions independently 8 ions correct = 4 marks 6/7 ions correct = 3 marks 4/5 ions correct = 2 marks 2/3 ions correct = 1 mark	NaI $(NH_4)_2CO_3$ $CaCl_2$ $FeCO_3$ no credit for either ion if incorrect formula given **instead** of name – ignore formulae if names also given		
		(b)			1	barium chloride (solution forms a) white precipitate test **and** result needed	barium nitrate / $Ba^{2+}(aq)$		

Question Number									
FT	HT	Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
	8	(a)			2	moles =conc × vol/1000 = $\frac{0.1 \times 17.5}{1000}$ (1) = 0.00175 (1) award (2) for cao			
		(b)			1	176			
		(c)			2	ecf possible from parts (a) and (b) mass = moles × M_r = 0.00175 ×176 (1) 0.308 g /308 mg (correct unit required) therefore statement incorrect (1)	alternative method using given 300 mg mass		

Question Number			
FT	HT	Mark	Answer
	9	6	**Indicative content** appropriate apparatus required, measured amount of alkali (or acid) in conical flask, add indicator *e.g. phenolphthalein,* add acid (alkali), drop-wise near end point/colour change, record volume of acid (alkali) added, repeat without indicator adding recorded volume of acid (alkali), boil off some of the water, leave solution to evaporate, dry crystals obtained *Credit awarded for sequenced labelled diagrams as part of the response.* **5-6 marks** The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. **3-4 marks** The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. **1-2 marks** The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. **0 marks** The candidate does not make any attempt or give a relevant answer worthy of credit.