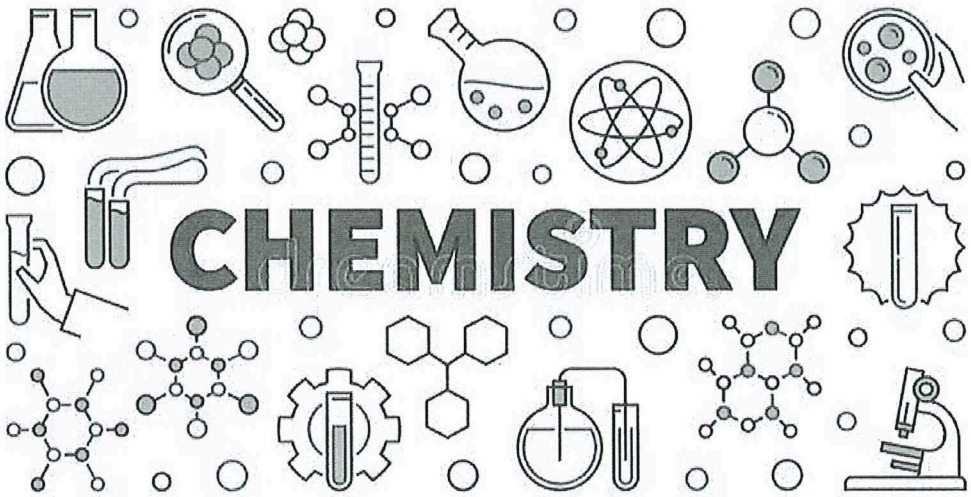
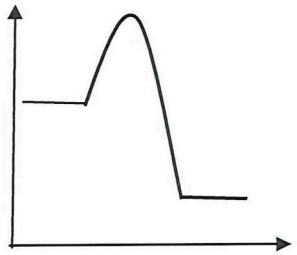


WJEC Chemistry 2

Option – Higher Tier

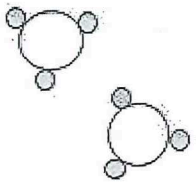
2.6 Mark Scheme

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)			**Indicative content** sulfur burns in air forming sulfur dioxide $S + O_2 \rightarrow SO_2$ sulfur dioxide converted to sulfur trioxide in a reversible reaction 1 atm – low pressure favours high yield 450°C – low temp favours high yield but rate is low V_2O_5 catalyst compensates for low rate sulfur trioxide added to conc. sulfuric acid forming oleum $SO_3 + H_2SO_4 \rightarrow H_2S_2O_7$ exothermic reaction oleum diluted with water to form sulfuric acid	6			6		
				5-6 marks Full description and explanation of each stage; attempt at explaining conditions *There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.* **3-4 marks** Description and partial explanation of at least two stages *There is a line of reasoning which is partially coherent, largely relevant, supported by some evidence and with some structure. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.* **1-2 marks** Basic description of at least one stage *There is a basic line of reasoning which is not coherent, largely irrelevant, supported by limited evidence and with very little structure. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.* **0 marks** *No attempt made or no response worthy of credit.*						

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(b)	(i)		495 / −495 (2) if incorrect award (1) for indication of 4 S=O bonds to be broken e.g. 4(523) / 2092 ecf possible		2		2	2	
		(ii)		551 / −551 (2) if incorrect award (1) for indication of correct bonds to be made e.g. 6(523) / 3138 ecf possible		2		2	2	
		(iii)			1			1		
				Question 5 total	**7**	**4**	**0**	**11**	**4**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)	(i)		NH_4NO_3 $\frac{34}{100} \times 690 = 234.6$ $CO(NH_2)_2$ $\frac{46}{100} \times 560 = 257.6$ award (1) for one of calculations award (2) for both calculations **and** urea given as answer do not credit 'urea' with no working ecf possible only for minor slip in calculations		1	1	2	2	
		(ii)		ammonium nitrate is better suited to British weather conditions than urea ✓			1	1		
	(b)	(i)		either of following $(NH_4)_2SO_4 + 2NaOH \rightarrow Na_2SO_4 + 2H_2O + 2NH_3$ $(NH_4)_2SO_4 + 2NaOH \rightarrow Na_2SO_4 + 2NH_4OH$ products (1) balancing (1) – reactants and products must be correct for balancing mark to be awarded		2		2		2
		(ii)		$Ba^{2+}(aq) + SO_4^{2-}(aq) \rightarrow BaSO_4(s)$ reactant ions and product (1) state symbols (1) – ions and product must be correct for state symbol mark to be awarded	1	1		2		
				Question 6 total	**1**	**4**	**2**	**7**	**2**	**2**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7	*(a)*			higher yield would be formed using a lower temperature (1) however lower temperatures result in a lower reaction rate (1) use of catalyst increases rate compensating for use of a moderately low temperature (1)	3			3		
	(b)			$2NH_3 + H_2SO_4 \rightarrow (NH_4)_2SO_4$ award (1) for product award (1) for balancing **only** if all formulae are correct		2		2		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
9/2	(a)	(i)		air do not accept oxygen	1			1		
		(ii)		award (1) for any sensible answer e.g. strong(er) equipment required requires thick(er) pipes requires strong(er) pipes more maintenance may explode more energy needed more expensive neutral answer - dangerous	1			1		
		(iii)		catalyst	1			1		
		(iv)		 award (2) for correct answer award (1) for one ammonia molecule drawn correctly award (1) max if any additional product(s) included		2		2		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(b)			A			1	1		
	(c)			$2NH_3 + 3Cl_2 \longrightarrow N_2 + \boxed{6}\ HCl$		1		1		
				Question 9/2 total	3	3	1	7	0	0