Mark Scheme - 7

1.

Mark	Answer
6 QWC	**Indicative content** • observations made when both acids react with metals, carbonates and bases e.g. temperature rise, liberation of gas, time to dissolve • difference in rate of reaction and explanation in terms of strong/weak acid • salts formed • word / chemical equations **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.

2.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)	(i)		1	battery acid			
	(ii)		1	blood			
	(iii)		1	**pure** water			
(b)			3	**A** copper carbonate (1) **B** copper oxide (1) **C** sodium hydroxide (1)	$CuCO_3$ CuO NaOH		

3.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)	(i)		1	sodium carbonate / Na_2CO_3	sodium hydrogencarbonate / $NaHCO_3$		
	(ii)		1	magnesium ethanoate / $(CH_3COO)_2Mg$			
(b)			1	(ethanoic acid/it) is a weaker acid / has a higher pH (than that of sulfuric acid) ethanoic acid pH is 3/4 and sulfuric acid pH is 1/2 ethanoic acid has a lower H^+ ion concentration than sulfuric acid	less acidic	ethanoic acid pH is 3/4	
(c)			1	ethanol / C_2H_5OH			

4.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)	(i)		1	$25cm^3 \pm 1cm^3$			
	(ii)		1	1.5 °C			
(b)			1	acid **A** (no mark) temperature rise is greater / produces more heat – mark can **only** be awarded if **A** given			
(c)			3	add acid slowly from burette (1) add indicator to sodium hydroxide solution / solution in cup (1) indicator changes colour (1)	indication of precision record volume required to change colour of indicator (2)		add indicator to acid/burette

5.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			1	pH value of 1			
(b)			1	nitric, hydrochloric etc	HNO_3, HCl etc		
(c)			1	carbon dioxide	CO_2		
(d)			2	the gas is denser / heavier than air (1) does not support combustion or burning / extinguishes or puts out a flame (1)	gas doesn't burn / is not flammable	flame goes out – unless qualified	

6.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)	(i)		1	lemon juice			
	(ii)		1	saliva			
(b)	(i)		2	magnesium chloride (1) water (1)	formulae		
	(ii)		2	carbon dioxide (1) gas must be correct to award test mark turns limewater milky (1)			

7.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)	(i)		1	2×10^6	2000000 2 million		2
	(ii)		2	***(1) for a reason and (1) for linked explanation*** sulfur scrubbing / react with lime / with sea water ….removes sulfur dioxide / neutralises sulfur dioxide use cleaner fuels …….remove sulfur from oil / gas / fuel use coal / fuel containing less sulfur use less coal ……greater use of alternative energy sources which do not produce sulfur dioxide			
	(iii)		1	$2SO_2 + 2H_2O + O_2 \longrightarrow 2H_2SO_4$			
(b)	(i)		1	neutralisation		exothermic	
	(ii)		2	(adding limestone) increases the pH (1) (higher the pH the) lower the acidity (1) *i.e. relationship between pH and acidity*	goes from 3.4 → 4.3 'weaker' the acidity		
	(iii)		1	increased lake acidity /decreased pH of lakes increased soil acidity / decreased pH of soil destruction of trees / fish killed / destruction of food chains / destruction of food webs increased metal corrosion (e.g. bridges)	lakes = reservoirs / ponds / rivers	'harmful to nature' 'marine life'	drinking water

8.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(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		

9.

Mark	Answer
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.

10.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			1	25.0	25		
(b)			3	number of moles NaOH = concentration × volume = 0.1 × 25/1000 = 0.0025 (1) (stoichiometry / equation shows 1:1) 0.0025 mol CH_3COOH : 0.0025 mol NaOH (1) concentration CH_3COOH = number of moles ÷ volume = 0.0025 ÷ 25/1000 = 0.1 (1) – correct answer only (cao) (3) – follow through error (ft)	cV = cV c × 25 = 0.1 × 25 (2) $c = \frac{0.1 \times 25}{25} = 0.1$		
(c)	(i)		1	60			
	(ii)		2	number of moles = concentration × volume = 0.1 × 100/1000 = 0.01 (1) number of moles = mass /M_r mass = number of moles × M_r = 0.01 × 60 = 0.6 g (∴ label information incorrect) (1)	number of moles in $100cm^3$ = 0.083 (1) concentration calculated above as 0.1 mol/dm^3 – not 0.83 mol/dm^3 (1)		