Revision PPQu – Gases of the Atmosphere and Reactivity MARK SCHEME

Q1.

Question number	Answer	Notes	Marks
(a)	Example calculation M1 (volume of oxygen =) 100 – 25 **OR** 75 (cm^3) M2 75 ÷ 365 × 100 M3 20.5 (%)	Correct answer of 20.5 % with or without working scores 3 **ALLOW** ecf from M1 **ALLOW** ecf from M2 **ALLOW** 2 or more significant figures **REJECT** incorrect rounding Use of 265 instead of 365 gives an answer of 28.3 and scores 2 Alternative method M1 (volume of air left =) 265 + 25 **OR** 290 (cm^3) M2 290 ÷ 365 × 100 **OR** 79.5 (%) M3 (100 – 79.5 =) 20.5 (%)	3
(b) (i)	M1 paint provides a barrier M2 which prevents oxygen / water getting to /reacting with the iron	**ALLOW** paint forms a coating (on the iron) / paint is non-permeable **ALLOW** air	2
(ii)	M1 zinc is more reactive/higher in the reactivity series (than iron) M2 zinc will oxidise / react / corrode instead of /before iron	**ALLOW** zinc is a sacrificial metal **IGNORE** references to zinc rusting **IGNORE** references to galvanising	2
			7 marks

(**Q04 4CH1/1C, Jan 2021**)

Q2.

Question number	Answer	Notes	Marks
(a) (i)	displacement	ALLOW redox	1
(ii)	(manganese) chromium cadmium tin		1
(b)	(copper and magnesium sulfate) M1 no colour change M2 copper is less reactive than magnesium ORA /copper cannot displace magnesium (zinc and iron sulfate) M3 zinc turns (from light grey to) dark grey M4 solution turns (from green to) colourless M5 zinc is more reactive than iron ORA/ zinc displaces iron	 ALLOW copper is below magnesium in the reactivity series ORA IGNORE copper and magnesium sulfate do not react M2 dep on M1 ALLOW zinc becomes coated in a dark grey metal ALLOW zinc is above iron in the reactivity series ORA ALLOW zinc reduces iron ions (ignore charge given as long as the charge is positive)	5
(c) (i)	Any two from M1 concentration of dilute sulfuric acid M2 temperature M3 surface area of the metal	 ALLOW size of piece of metal	2
(ii)	calcium sulfate forms a layer / coating around the calcium metal	ALLOW calcium sulfate prevents the sulfuric acid coming into contact with calcium.	1

Total marks for question = 10

(Q11 4CH1/1C, Nov 2021)

Q3.

Question number	Answer	Notes	Marks
(a)	galvanising	**ACCEPT** galvanisation	1
(b) (i)	rust		1
(ii)	**M1** oxygen / air	**ACCEPT** O_2 **IGNORE** O	2
	M2 water	**ACCEPT** H_2O/moisture **ACCEPT** in either order	
(c) (i)	An explanation that links the following two points		2
	M1 aluminium/Al is more reactive than iron/Fe	**ACCEPT** aluminium/Al is higher in reactivity series than iron/Fe **ACCEPT** reverse argument	
	M2 (because) aluminium/Al displaces iron/Fe (from its oxide)	**ALLOW** replaces/takes place of	
(ii)	An explanation that links the following three points		3
	M1 aluminium is oxidised and iron/iron oxide is reduced	**ALLOW** both oxidation and reduction occur	
	M2 aluminium gains oxygen	**ALLOW** aluminium/Al loses electrons	
	M3 iron oxide/iron loses oxygen	**ALLOW** iron ions /Fe^{3+} gains electrons **ALLOW** correct references to changes in oxidation number for **M2** and **M3**	

Total marks for question = 9

(**Q03 4CH1/1C, Jan 2020**)

Q4.

Question number	Answer	Notes	Marks
(a) (i)	argon / helium	**ACCEPT** Ar / He	1
(ii)	nitrogen	**ACCEPT** N_2	1
(iii)	carbon dioxide	**ACCEPT** CO_2	1
(iv)	carbon dioxide	**ACCEPT** CO_2	1
(b) (i)	$S + O_2 \rightarrow SO_2$		1
(ii)	acid rain	**ACCEPT** an adverse effect of acid rain e.g. kills fish, damages plants, corrodes limestone/marble buildings/statues etc. **IGNORE** toxic/pollutant	1
			Total 6

(**Q01 4CH1/1C, Jan 2020**)

Extension
Q5.

Question number	Answer	Notes	Marks
(a)	(thermal) decomposition (1)		1
(b)	any two of the following: M1 (use the same) amount of metal carbonate M2 (use the same) sized pieces/surface area M3 (use the same) volume of limewater M4 (use same) size flame / distance of flame from boiling tube OWTTE	 ALLOW mass ALLOW amount	2
(c)	bubbles are air (from tube) / caused by air (expanding on heating)	ALLOW gas in tube expands (on heating)	1
(d)	explanation including M1 (when limewater turns milky/cloudy it) shows carbon dioxide produced M2 showing metal carbonate has reacted/decomposed	 ALLOW carbon dioxide comes from carbonate (reacting/decomposing)	2
(e) (i)	M1 (from) green M2 (to) black	IGNORE qualifiers eg light	2
(ii)	$CuCO_3 \rightarrow CuO + CO_2$	ALLOW products in either order	1
(f) (i)	M1 the lower the metal is (in the reactivity series) M2 the more easily the (metal) carbonate reacts/decomposes	ALLOW the less reactive a metal is ALLOW the more easily the (metal) carbonate produces carbon dioxide ALLOW references to the less time the (metal) carbonate takes to react/decompose ALLOW references to the faster the (metal) carbonate reacts/decomposes ACCEPT reverse arguments	2
(ii)	repeat (the investigation) using different / other / more (metal) carbonates		1
		(Total for Question = 12)	

(**Q05 4CH1/1CR, Jan 2021**)