EXAM PAPERS PRACTICE

Boost your performance and confidence with these topic-based exam questions

Practice questions created by actual examiners and assessment experts

Detailed mark scheme

Suitable for all boards

Designed to test your ability and thoroughly prepare you

Time allowed
55 Minutes

Score /46

Percentage %

CHEMISTRY

Edexcel AS & A LEVEL

Mark Scheme

Paper 1: Advanced Inorganic and Physical Chemistry

Question Number	Acceptable Answers	Reject	Mark
1(a)(i)	Add hydrochloric acid / HCl(aq) / nitric acid / HNO_3(aq) ALLOW Just 'acid' only if a suitable acid is given in equation one Sulfuric acid / H_2SO_4((aq)) or HCl (1) IGNORE 'conc' Gas / carbon dioxide / CO_2 evolved turns lime water milky / cloudy / produces a white precipitate (1) MP2 is a stand alone mark but there must be some indication that a gas is being tested	Just 'acid' OR heating the carbonate	2

Question Number	Acceptable Answers	Reject	Mark
1(a)(ii)i)	ALL H_2CO_3(aq) for H_2O(l) + CO_2(g) $BaCO_3$(s) + 2HCl(aq) → $BaCl_2$(aq) + H_2O(l) + CO_2(g) OR $BaCO_3$(s) + 2HNO_3(aq) → $Ba(NO_3)_2$(aq) + H_2O(l) + CO_2(g) OR CO_3^{2-}(s) + 2H^+(aq) → H_2O(l) + CO_2(g) ALLOW $BaCO_3$(s) + H_2SO_4(aq) → $BaSO_4$(s/aq) + H_2O(l) + CO_2(g) OR $BaCO_3$(s) → BaO(s) + CO_2(g) (1) $Ca(OH)_2$(aq) + CO_2(g) → $CaCO_3$(s) + H_2O(l) (1) All state symbols in both equations correct (1) ALLOW State symbols mark if first equation not balanced but ALL species are correct. No TE on other equations		3

Question Number	Acceptable Answers	Reject	Mark
1(b)(i)	MP1 and MP2 Dip (clean) nichrome / platinum wire ALLOW loop / rod for wire OR Silica rod (1) in hydrochloric acid / HCl(aq) ALLOW any mention of HCl(aq) e.g. cleaning or mixing solid and acid HCl for HCl(aq) (1) ALLOW (for MP1 and MP2) (Wooden) splint (1) Soaked in distilled / deionised water (1) MP3 then dipped in solid and placed in (hot / roaring / blue-cone) (Bunsen) flame ALLOW On / over / under / above for 'in' (1) IGNORE inoculating / flame-test (wire)	Nickel / chrome / chromium spatula Other acids just 'water'	3

Question Number	Acceptable Answers	Reject	Mark
1(b)(ii)	A = Mg^{2+} (1) B = Ca^{2+} (1) Penalise omission of $^{2+}$ only once Correct ions with correct charge but the wrong way round scores 1 mark Correct ions with incorrect / no charge scores 1 IGNORE Names / compounds		2

Number			
1(b)*(iii)	Read the whole answer before awarding marks. If no mention of electrons only MP3 may be awarded. Electrons promoted to higher energy level (by thermal energy / heat from (Bunsen) flame) (1) (Promoted) electrons fall / drop / relax to lower energy level / orbital / shell / subshell OR Electrons return to ground state (1) Emitting radiation / light / photons (in the visible region) (1) IGNORE Colour	Just 'electrons promoted/ excited' Just 'energy lost' Just 'energy given out	3

Question Number	Acceptable Answers	Reject	Mark
1(b)(iv)	Emitted radiation is not in the visible region (of the spectrum) ALLOW Emitted radiation is in IR / UV		1

Question Number	Acceptable Answers	Reject	Mark
1(c)	As group is descended... First mark (metal ion size) (Metal) ion radius increases / has more (electron) shells (but charge remains the same) OR Charge density of metal ion decreases ALLOW (Metal) atomic radius increases / has more (electron) shells (1) Second mark (polarizing species) Polarizing (ALLOW distorting) power of cation / metal ion decreases (1) Third mark (polarized species) Polarization / distortion of (electron cloud of) carbonate ion /anion decreases ALLOW C—O / C═O for carbonate ion (1) (so carbonate more stable to heat) ALLOW reverse argument for ascent of the group.	Just “metal” Just ‘ion’ Just ‘ion or bond’	3

Total for Question = 17 marks

Question Number	Acceptable Answers	Reject	Mark
2 (a)	The outer electrons are closer to the nucleus/smaller atomic radius/ less electron shells (in calcium) (1) Less shielding (in calcium) (1) OR Reverse argument for strontium Ignore reference to repulsion between shells	Ionic radius/ Molecules Just 'less electrons'	2

Question Number	Acceptable Answers	Reject	Mark
2 (b)(i)	Nichrome wire / platinum wire / silica rods (1) (Dip / clean) in (concentrated) HCl/HCl(aq)/dilute HCl and place in Bunsen flame (1) OR Allow alternative procedures such as: Make a salt solution (1) Soak in wooden splint and place in Bunsen flame (1)	Nickel/Ni/ Chromium/Cr/ Metal loop/wire Yellow flame/burn	2

Question Number	Acceptable Answers	Reject	Mark
2 (b)(ii)	(Pale/Light) green / apple green	Blue-green	1

Question Number	Acceptable Answers	Reject	Mark
2 (b)(iii)	Electrons promoted to higher energy level (1) Electron(s) return to lower energy level (1) Release of (visible/ light) energy/ photon upon return (1)	 Proton	3

Question Number	Acceptable Answers	Reject	Mark
2 (c)(i)	Barium hydroxide / $Ba(OH)_2$ Allow product as part of the equation: $Ba + 2H_2O \rightarrow Ba(OH)_2 + H_2$		1

Question Number	Acceptable Answers	Reject	Mark
2 (c)(ii)	Bubbles / Fizzing / Effervescence IGNORE The Barium dissolves / forms a colourless solution Increase in temperature	The metal sinks Air bubbles Just 'a gas is produced'	1

Question Number	Acceptable Answers	Reject	Mark
2 (d)(i)	Barium is oxidized from 0 to +2 (1) Chlorine is reduced from 0 to -1 (1) Allow one mark if oxidized and reduced are the wrong way round Ignore reference to transfer of electron unless incorrect.		2

Question Number	Acceptable Answers	Reject	Mark
2 (d)(ii)	$Ba^{2+}(aq) + SO_4^{2-}(aq) \rightarrow BaSO_4(s)$ One mark for chemical symbols (1) One mark for state symbols (1) Allow one mark maximum for: $BaCl_2(aq) + H_2SO_4(aq) \rightarrow BaSO_4(s) + 2HCl(aq)$ OR Ions not cancelled	 $BaSO_4(aq)$	2

Question Number	Acceptable Answers	Reject	Mark
2 (d)(iii)	To prevent formation of carbonate / sulfite / sulfate(IV) (precipitate) / to remove carbonate / sulfite / sulfate(IV) ions	Just 'to remove other ions'	1

Question Number	Acceptable Answers	Reject	Mark
2 (e)(i)	$MgCO_3 + 2HCl \rightarrow MgCl_2 + H_2O + CO_2$ Ignore state symbols even if incorrect ALLOW $MgCO_3 + 2HCl \rightarrow MgCl_2 + H_2CO_3$		1

Question Number	Acceptable Answers	Reject	Mark
2 (e)(ii)	Marking Point 1 (Factor) Use larger lumps (1) Marking Point 2 (Explanation) Decreases surface area OR Fewer collisions between the reactants (1) Alternatively Marking Point 1 (Factor) Decreases surface area (1) Marking Point 2 (Explanation) Fewer collisions between the reactants (1) Marking Point 3 (Factor) Decrease concentration (of acid) (1) Marking Point 4 (Explanation) Fewer collisions between the reactants OR Fewer particles for the same volume (1) Explanation marking point only awarded for correct factor or a near miss.	Just 'increased size of $MgCO_3$' Just 'change in volume of acid'	4

Question Number	Acceptable Answers	Reject	Mark
2 (f)	Pressure only affects gaseous reactions/ There is no significant volume change/the liquids are incompressible		1

Question Number	Acceptable Answers	Reject	Mark
3(a)(i)	A hydrocarbon (solvent) / volasil / named hydrocarbon solvent / tetrachloromethane Formulae	Ethanol Alkenes	1

Question Number	Acceptable Answers	Reject	Mark
3(a)(ii)	Red / brown /orange / amber / yellow Or any combination No TE on incorrect / no reagent		1

Question Number	Acceptable Answers	Reject	Mark
3(b)(i)	Oxidation number of S in H_2SO_4 =(+)6 Oxidation number of S in SO_2 =(+)4 (1) Oxidation number had decreased (1) ALLOW S has gained electrons for second mark Second mark stands alone provided oxidation numbers have decreased, even if calculated wrongly	Just 'S has gained electrons' without calculating oxidation numbers	2

Question Number	Acceptable Answers	Reject	Mark
3(b)(ii)	Black / (shiny) grey solid (1) Purple / violet / pink vapour / fumes (1) Smell of (bad) eggs (1) Yellow solid (1) ALLOW Brown liquid (1) Any two	Purple solid	2

Question Number	Acceptable Answers	Reject	Mark
3(b)(iii)	Oxidation number of S has reduced more / to –2 (in H_2S) (1) OR Oxidation number of S is lower in H_2S (than in SO_2) If ON of S in H_2S is calculated it must be correct		1

Question Number	Acceptable Answers	Reject	Mark
3(c)	People can choose whether to take extra fluoride ALLOW Fluoride is not released into the environment	Fluoride can be monitored	1