

01. 0620_s15_ms_31 Q: 3

(a)(i)	Zn to Zn ²⁺ ; because electron loss;	2	A because oxidation number has increased for M2
(a)(ii)	(2)H ⁺ or 'hydrogen ion(s)'; it accepts electrons or takes electrons (from zinc atoms);	2	R H ₂ or 'hydrogen' A because it is reduced or because it decreases in oxidation number A it causes zinc to lose electrons
(b)(i)	zinc displaces copper or zinc more reactive than copper; Zn + CuCl ₂ → ZnCl ₂ + Cu OR Zn + Cu ²⁺ → Cu + Zn ²⁺ ;	2	A copper less reactive than zinc I zinc reacts with copper ions or with Cu ²⁺ or with copper chloride I zinc reacts with copper I Cu ²⁺ ions are reduced A multiples I state symbols
(b)(ii)	steeper (line) or higher gradient; (means an) increased rate; but the same (final) volume;	3	A less time to complete the reaction / same amount of gas in less time / faster reaction / more gas in the same time period A same volume of hydrogen produced A 'amount' for volume A no extra gas is made
3(c)	M1 less steep (line) or lower gradient; M2 (because of) decreased rate; M3 ethanoic is a weak(er) acid; M4 only partially ionised or dissociated OR lower concentration of hydrogen ions;	4	A alternative phrases e.g. 'shallower' A more time to complete the reaction A same amount of gas in more time A slower rate or slower reaction ORA A not fully dissociated or ionised A ionises less (than HCl) I less hydrogen ions
(d)	M1 moles of HCl = 0.1 (mol); M2 moles of Zn = 0.05 (mol); mass of zinc = 3.25 g;	3	A ECF for M1 × ½ A ECF for M2 × 65 Unit required for M3

02. 0620_s15_ms_32 Q: 3

(a)	<p>M1 both correct charges of ions (calcium 2+ and nitrogen 3-);</p> <p>M2 8 electrons around nitrogen (can be 3 dots and 5 crosses or 5 crosses and 3 dots or all dots or all crosses, but reject any other combinations of dots and crosses);</p> <p>M3 Two electrons on the inner shell on any nitride ions/nitrogen atom: allow 2x or 2o once;</p>	<p>Charges can be shown anywhere I missing symbols for nitrogen R wrong symbol of nitrogen anywhere</p> <p>A if electron configuration of nitride is given as 2,8 or N is given as 2,5 I any missing inner shells as long as one is present</p> <p>3 <i>General guidance:</i> I electron configuration /symbol of calcium ion I formulae/stoichiometry Covalent can score only M3</p>
(b)(i)	<p>regular /repeated /pattern /framework /periodic /ordered /alternating /organised;</p> <p>(of)particles /atoms /molecules /ions /cations /anions;</p>	<p>I layers</p> <p>2 A ionic /molecular /atomic I arrangement /bonding /properties</p>
(b)(ii)	<p>M1 (so that ionic) charges balance or cancel / charge = 0 /no charge /number of positive = number of negative charges /charge is neutral or neutralised;</p> <p>M2 $3(-) \times 2 = 2(+) \times 3$;</p>	<p>A $6(+) = 6(-)$</p> <p>2 I statements about electron transfer /valency /ox state unless valency is referring to ionic charges e.g. valencies 3+ and 2- can get credit if used properly Ratio of ions is 3:2 therefore ratio of charges is 2:3 scores 2</p>
(c)	<p>it (refers to Ca) / Calcium /Ca (atom) loses /gives /donates electrons /e /e⁻ ;</p> <p>(these are) gained by nitrogen /N /N₂ ;</p> <p>nitrogen /N /N₂ is reduced so calcium /Ca is the reducing agent (these two statements could be split i.e. not in same sentence) OR reducing agents are electron donors /give /lose electrons OR calcium /Ca is oxidised (by electron loss) therefore calcium is the reducing agent (these two statements could be split i.e. not in same sentence);</p>	<p>A half-equation with electrons on right-hand side R calcium ion /Ca²⁺</p> <p>A half-equation with electrons on left-hand side R nitride ion /N³⁻ I numbers of electrons /charges on ions /oxidation state /valency if mentioned R reference to oxygen /hydrogen if there is a suggestion that oxygen /hydrogen are involved in the reaction I reference to oxygen /hydrogen if in general statement e.g. oxidation is gain of oxygen</p> <p>Electrons /e /e⁻ move from calcium to nitrogen get marks 1 and 2</p> <p>A calcium /Ca /it is a reductant or calcium /Ca /it reduces</p> <p>3</p>