Multiple Choice Answers

Q19: C

Q20: B

Multiple Choice Answers

Q19: D

Q20: B

Multiple Choice Answers

Q18: C

<table>
<tr><td>2(a)(i)</td><td>M1 nuclear charge increases (across period) AND similar shielding

M2 greater / stronger attraction to nucleus</td></tr>
<tr><td>2(a)(ii)</td><td>M1 Al loses (3) electrons / Al is 3+, and P gains (3) electrons / P is 3–

M2 $Al^{(3+)}$ has (one) fewer shell (than $P^{(3-)}$)</td></tr>
<tr><td>2(b)(i)</td><td>
<table>
<tr><td>M1</td><td>(+)1</td><td>(+)2</td><td>(+)3</td><td>(+)4</td><td>(+)5</td><td>(+)6</td></tr>
<tr><td>M2</td><td>12-14</td><td>8-10</td><td>—</td><td>—</td><td>0-4</td><td>0-4</td></tr>
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</td></tr>
<tr><td>2(b)(ii)</td><td>they are insoluble</td></tr>
<tr><td>2(c)(i)</td><td>$Na_2O + 2HCl \rightarrow 2NaCl + H_2O$</td></tr>
<tr><td>2(c)(ii)</td><td>$Al_2O_3 + 2NaOH \rightarrow 2NaAlO_2 + H_2O$</td></tr>
<tr><td>2(d)(i)</td><td>(thermal stability) increases (down the group)</td></tr>
<tr><td>2(d)(ii)</td><td>NO_2 AND O_2</td></tr>
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<table>
<tr><td>1(a)</td><td>$Mg(NO_3)_2 \rightarrow MgO + 2NO_2 + ½O_2$ OR $2Mg(NO_3)_2 \rightarrow 2MgO + 4NO_2 + O_2$</td></tr>
<tr><td>1(b)</td><td>M1: $Mg(NO_3)_2$ / magnesium nitrate
AND magnesium ion / Mg^{2+}
AND is smaller / has higher charge density

M2: nitrate ion / anion is more distorted / polarised</td></tr>
<tr><td>1(c)(i)</td><td>magnesium sulfate and water / $MgSO_4$ and H_2O</td></tr>
<tr><td>1(c)(ii)</td><td>M1: magnesium sulfate / A has a more exothermic ΔH_{latt} and ΔH_{hyd}
M2: difference in ΔH_{hyd} is greater
M3: magnesium sulfate / A has a more exothermic ΔH_{sol}</td></tr>
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1(a)(i)	$Sr(HCO_3)_2 \rightarrow SrCO_3 + CO_2 + H_2O$
1(a)(ii)	**M1**: radius of cation / M^{2+} increases **OR** charge density of cation / M^{2+} decreases **M2**: less polarisation / less distortion of the anion / carbonate ion
1(b)	**M1**: least soluble CaF_2 < SrF_2 < BaF_2 most soluble **M2**: ΔH_{latt} and ΔH_{hyd} both become less exothermic / less negative **M3**: ΔH_{hyd} changes less / becomes less exothermic by a smaller extent **OR** ΔH_{latt} changes more / becomes less exothermic by a larger extent **M4**: ΔH_{sol} becomes more exothermic / more negative
1(c)(i)	enthalpy change when one mole of gaseous ions dissolve in water to form a solution
1(c)(ii)	**M1**: ionic radii **AND** ionic charge **M2**: (ionic) radii increase / charge density decreases **AND** ΔH_{hyd} decreases/less exothermic **AND** less attraction between water molecules and (gaseous) ions **OR** as ionic charge increases / charge density increases **AND** ΔH_{hyd} increases/more exothermic **AND** more attraction between water molecules and (gaseous) ions
1(d)	**M1**: use of –2957 / –1926 / –505 **AND** $2 \times (-505)$ **M2**: correct signs and evaluation ΔH_{sol} of $MgF_2(s) = -1926 + (2 \times -505) - (-2957) = (+)21$ kJ mol^{-1}
1(e)(i)	**M1:** $K_{sp} = [Hg_2^{2+}] [F^-]^2$ **M2:** units = $mol^3\ dm^{-9}$
1(e)(ii)	$K_{sp} = 2^2 \times (9.20 \times 10^{-3})^3$ = **3.11×10^{-6}** min 2sf