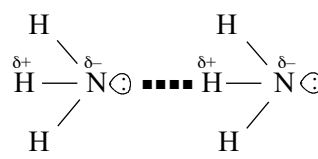
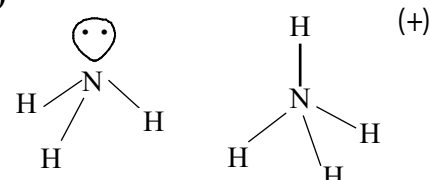


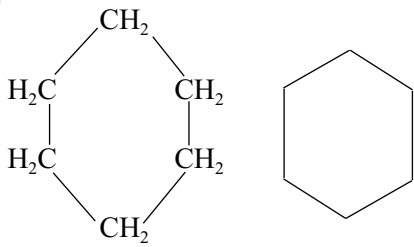
Answers to examination-style questions

Answers	Marks	Examiner's tips																												
<p>1 (a)</p> <table border="1"> <thead> <tr> <th></th> <th>relative mass</th> <th>relative charge</th> </tr> </thead> <tbody> <tr> <td>proton</td> <td>1</td> <td>+1</td> </tr> <tr> <td>electron</td> <td>1/1800</td> <td>-1</td> </tr> </tbody> </table>		relative mass	relative charge	proton	1	+1	electron	1/1800	-1	<p>1</p> <p>1</p>	<p>This is just easy learning stuff. Make sure you put the – and + signs for the electron and proton though, i.e. not just 1.</p>																			
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<p>(b) ^{38}Ar</p> <p>(c) (i) $1s^22s^22p^6$</p>	<p>2</p> <p>1</p>	<p>Remember the order of filling up the levels. Remember that ions have the noble gas arrangement.</p>																												
<p>(ii) any two from: more protons / atomic number / proton number / bigger nuclear charge Al^{3+} smaller (size) than Na^+ / e^- closer to nucleus / more attraction for e^- from / e^- pulled more strongly by Al^{3+}</p>	<p>2</p>	<p>This type of question is common so learn the points well. Remember that the 3+ ions have more pulling power and why.</p>																												
<p>2 (a) (i) assume it is corrosive so wash hands if spilt on skin, etc.</p> <p>(ii) $21.7 \times 10^{-3} \times 0.150 = 3.255 \times 10^{-3}$ (mol)</p> <p>(iii) in $25 \text{ cm}^3 = (3.255 \times 10^{-3}) / 2 = 1.63 \times 10^{-3}$ (mol) in sample = 1.63×10^{-2}</p> <p>(iv) $M_r = 1.92 / 1.63 \times 10^{-2} = 117.9 = 118$</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	<p>Think of sensible reasons.</p> <p>Mass = vol. in $\text{dm}^3 \times \text{conc}$. Don't forget to convert the titre into dm^3.</p> <p>Half the no. of moles of acid as in the equation.</p> <p>Multiply by 10 since titre done on 25 cm^3 but sample is 250 cm^3</p> <p>mass = $M_r \times \text{mole}$</p>																												
<p>(b) (i) simplest ratio of atoms of each element (in a compound)</p>	<p>1</p>	<p>Learn this definition. It's not just simplest ratio of atoms, it must have 'of each element'.</p>																												
<p>(ii)</p> <table border="1"> <thead> <tr> <th></th> <th>C</th> <th>H</th> <th>O</th> </tr> </thead> <tbody> <tr> <td></td> <td>49.31</td> <td>6.85</td> <td>43.84</td> </tr> <tr> <td></td> <td>12</td> <td>1</td> <td>16</td> </tr> <tr> <td></td> <td>4.11</td> <td>6.85</td> <td>2.74</td> </tr> <tr> <td></td> <td>1.5</td> <td>2.5</td> <td>1</td> </tr> <tr> <td>ratio</td> <td>3</td> <td>5</td> <td>2 or $\text{C}_3\text{H}_5\text{O}_2$</td> </tr> <tr> <td></td> <td colspan="3">$= \text{C}_3\text{H}_5\text{O}_2 \times 146 / 73 = \text{C}_6\text{H}_{10}\text{O}_4$</td> </tr> </tbody> </table>		C	H	O		49.31	6.85	43.84		12	1	16		4.11	6.85	2.74		1.5	2.5	1	ratio	3	5	2 or $\text{C}_3\text{H}_5\text{O}_2$		$= \text{C}_3\text{H}_5\text{O}_2 \times 146 / 73 = \text{C}_6\text{H}_{10}\text{O}_4$			<p>1</p> <p>1</p>	<p>Divide by the A_r</p> <p>Work out the M_r of the empirical formula first and then see how many times it goes into the actual M_r of the compound.</p>
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(c) (i) $pV = nRT$	1	Learn this
$= \frac{pV}{RT} = \frac{100\,000 \times 352 \times 10^{-6}}{8.31 \times 298}$	1	Don't forget the units needed for the ideal gas equation
moles $\text{CO}_2 = 0.0142$ (mol)	1	
(ii) get rid of CO_2 by reacting with CaO	1	Just learn this.
(iii) moles $\text{NaHCO}_3 = 0.0142 \times 2$ (= 0.0284 (mol))	1	Look at the equation. There were twice as many moles of NaHCO_3 to decompose to give 1 mole of CO_2
mass $\text{NaHCO}_3 = 84 \times 0.0284$ = 2.38–2.39 g	1	mass = $M_r \times$ mole
	1	
3 (a) (i) difference in electronegativity / F more electronegative than H	1	Remember it's the difference in electronegativity that is needed not just the electronegativity values.
bonding electrons drawn towards F	1	State which way the electrons flow.
(ii) NH_3	1	Electronegativity increases across the period.
(iii) N has smallest electronegativity of N, O and F NH_3 has smallest electronegativity difference	1	
(b) (i) hydrogen bonding	1	Don't just put hydrogen.
(ii)		
		
1 pair of charges shown on both molecules	1	
lone pair on both molecules	1	
hydrogen bond between lone pair and H atom	1	A diagram is asked for so you must do that and make sure all the charges, lone pairs, etc. are shown. (If this is asked for as just writing then you need to know the 3 points well.)
(c) (i) dative / co-ordinate	1	Learn this.
(ii)		
	4	

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(iii) pyramidal / (distorted) tetrahedral / (trigonal) pyramid	1	
(iv) $109\frac{1}{2}^\circ$	1	Although these are both based on a tetrahedron you should learn the shapes of just the atoms in each case. Learn the bond angles and in this case realise that it's a regular tetrahedron in NH_4^+ since it has 4 bonds.
4 (a) zeolite <i>or</i> aluminosilicate <i>or</i> pumice <i>or</i> porous pot <i>or</i> Al_2O_3 <i>or</i> aluminium oxide <i>or</i> ceramic	1	The most common answer is zeolite.
(b) $\text{C}_{10}\text{H}_{22} \rightarrow \text{C}_3\text{H}_6 + \text{C}_7\text{H}_{16}$ <i>or</i> $\text{C}_{10}\text{H}_{22} \rightarrow 2\text{C}_3\text{H}_6 + \text{C}_4\text{H}_{10}$ <i>or</i> $\text{C}_{10}\text{H}_{22} \rightarrow 3\text{C}_3\text{H}_6 + \text{CH}_4$	1	Just make sure your equation balances.
(c) can be made into a polymer	1	
(d) (i) <u>catalytic</u> (cracking)	1	
(ii) <u>excess</u> / <u>plentiful</u> / <u>lots of</u> oxygen or O_2 or air	1	This is not just a good supply of oxygen, etc. It must be excess.
(iii) CO_2 given off which contributes to the greenhouse effect need to burn less (alkanes as) fuels	1 1	This includes HSW and you need to think how to express yourself clearly. Don't waffle. There will not be enough space to do that.
(iv)		
	1	You do not need to show the C–H bonds on the hexagon structure.
(v) $\text{C}_6\text{H}_{12} + 3\text{O}_2 \rightarrow 6\text{C} + 6\text{H}_2\text{O}$	1	Make sure the equation balances.
(e) (i) $\frac{1}{2}\text{N}_2 + \frac{1}{2}\text{O}_2 \rightarrow \text{NO}$ <i>or</i> $\text{N}_2 + \text{O}_2 \rightarrow 2\text{NO}$ spark <i>or</i> <u>high</u> temperature <i>or</i> $2500\text{ }^\circ\text{C} \leq T \leq 4000\text{ }^\circ\text{C}$	1	Don't write just heat.
(ii) platinum <i>or</i> Pt <i>or</i> rhodium <i>or</i> Rh <i>or</i> palladium <i>or</i> Pd	1	
(iii) $\text{CO} + \text{NO} \rightarrow \text{CO}_2 + \frac{1}{2}\text{N}_2$ <i>or</i> $2\text{CO} + 2\text{NO} \rightarrow 2\text{CO}_2 + \text{N}_2$	1	

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5 (a) Na has less protons / smaller nuclear charge same shielding as Mg so outer electrons pulled in less to nucleus	1 1	When writing these free response answers make sure you do not refer to 'it'. This is very unclear and generally if the answer is ambiguous it will not score. Write the Na ... or Mg ..., etc. Be specific in your answer.
(b) $\text{Na(g)} \rightarrow \text{Na}^{\text{+}}(\text{g}) + \text{e}^{-}(\text{g})$	2	One mark for equation and one for state symbols
first electron taken from a neutral atom but second electron removed from a +ve ion which requires more energy	1 1	A + ion has greater attraction for an electron.
(c) <i>diagram</i> : $\text{Na}^{\text{+}}$ and Cl^{-} ions correctly placed in 3D (min. 8 ions although the 8th one can be hidden)	2	Look up this cubic arrangement if you cannot remember it and learn to draw the cube containing the ions.
opposite – ion / electrostatic attractions are strong / difficult to overcome	1 1	You need to refer to the fact that there are + and – ions that attract.
conducts only when molten or in aqueous solution as ions can move	1 1	This is all learning. When writing these free response answers do not refer to 'it'.
6 (a) ionisation by an electron gun deflection by a magnetic field / (electro)magnet	1 1 1 1	These marks are straightforward learning and can be achieved easily.
(b) $\frac{(188 \times 1.5) + (189 \times 2.5) + (190 \times 3.0) + (192 \times 4.5)}{11.5}$	1 1	In this case you need to add up all the abundances on the y-axis for the denominator.
= 190.3 Z = Os	1 1	Read off your number against the A_r (top number.) from periodic table.

Nelson Thornes is responsible for the solution(s) given and they may not constitute the only possible solution(s).