



# JABchem



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## Past Papers

## Standard Grade

# General

## Chemistry

# 2011

## Marking Scheme

2011 General	KU		PS	
	/30	%	/30	%
3	+19	63%	+21	70%
4	+14	47%	+15	50%
5	+11	37%	+12	40%
7	<11	<37%	<12	<40%

# 2011 Standard Grade Chemistry General Marking Scheme

Question	Answer	Chemistry Covered																												
1a	C	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">Answer</td> <td style="width: 12.5%;">A</td> <td style="width: 12.5%;">B</td> <td style="width: 12.5%;">C</td> <td style="width: 12.5%;">D</td> <td style="width: 12.5%;">E</td> <td style="width: 12.5%;">F</td> </tr> <tr> <td>Symbol</td> <td>Mg</td> <td>N</td> <td>Ag</td> <td>S</td> <td>F</td> <td>Si</td> </tr> <tr> <td>Element</td> <td>Magnesium</td> <td>Nitrogen</td> <td>Silver</td> <td>Sulphur</td> <td>Fluorine</td> <td>Silicon</td> </tr> <tr> <td>Group</td> <td>Group 2</td> <td>Group 5</td> <td>Transition Metal</td> <td>Group 6</td> <td>Group 7</td> <td>Group 4</td> </tr> </table>	Answer	A	B	C	D	E	F	Symbol	Mg	N	Ag	S	F	Si	Element	Magnesium	Nitrogen	Silver	Sulphur	Fluorine	Silicon	Group	Group 2	Group 5	Transition Metal	Group 6	Group 7	Group 4
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1b	D	Elements in the same group (column) on the Periodic Table have similar chemical properties. <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">Answer</td> <td style="width: 12.5%;">A</td> <td style="width: 12.5%;">B</td> <td style="width: 12.5%;">C</td> <td style="width: 12.5%;">D</td> <td style="width: 12.5%;">E</td> <td style="width: 12.5%;">F</td> </tr> <tr> <td>Symbol</td> <td>Mg</td> <td>N</td> <td>Ag</td> <td>S</td> <td>F</td> <td>Si</td> </tr> <tr> <td>Element</td> <td>Magnesium</td> <td>Nitrogen</td> <td>Silver</td> <td>Sulphur</td> <td>Fluorine</td> <td>Silicon</td> </tr> <tr> <td>Group</td> <td>Group 2</td> <td>Group 5</td> <td>Transition Metal</td> <td>Group 6</td> <td>Group 7</td> <td>Group 4</td> </tr> </table>	Answer	A	B	C	D	E	F	Symbol	Mg	N	Ag	S	F	Si	Element	Magnesium	Nitrogen	Silver	Sulphur	Fluorine	Silicon	Group	Group 2	Group 5	Transition Metal	Group 6	Group 7	Group 4
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2a	A	<ul style="list-style-type: none"> <li>tablet would dissolve slower than powder</li> <li>20°C would dissolve the slowest</li> </ul>																												
2b	B+D <small>Both for 1 mark</small>	Particles Size is the variable being altered: Powder and Tablet <ul style="list-style-type: none"> <li>Temperature must be the same (40°C)</li> </ul>																												
3a	D	Galvanising: Zinc coating provides sacrificial protection to iron																												
3b	F	Metals above hydrogen in electrochemical series react with dilute acids <ul style="list-style-type: none"> <li>Metals below hydrogen do not react with dilute acids: copper, mercury, silver, gold, platinum</li> </ul>																												
3c	E	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">Element</td> <td style="width: 12.5%;">Sodium</td> <td style="width: 12.5%;">Calcium</td> <td style="width: 12.5%;">Potassium</td> <td style="width: 12.5%;">Zinc</td> <td style="width: 12.5%;">Tin</td> <td style="width: 12.5%;">Gold</td> </tr> <tr> <td>RAM</td> <td>23</td> <td>40</td> <td>39</td> <td>65.5</td> <td>118.5</td> <td>197</td> </tr> </table>	Element	Sodium	Calcium	Potassium	Zinc	Tin	Gold	RAM	23	40	39	65.5	118.5	197														
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5a	D	Ionic compounds are compounds containing metals and non-metals. <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">Answer</td> <td style="width: 12.5%;">A</td> <td style="width: 12.5%;">B</td> <td style="width: 12.5%;">C</td> <td style="width: 12.5%;">D</td> <td style="width: 12.5%;">E</td> <td style="width: 12.5%;">F</td> </tr> <tr> <td>Substance</td> <td>He</td> <td>NO<sub>2</sub></td> <td>H<sub>2</sub></td> <td>K<sub>2</sub>O</td> <td>O<sub>2</sub></td> <td>CO<sub>2</sub></td> </tr> <tr> <td>Element</td> <td>monatomic</td> <td>covalent molecule</td> <td>covalent molecule</td> <td><b>Ionic</b></td> <td>covalent molecule</td> <td>covalent molecule</td> </tr> </table>	Answer	A	B	C	D	E	F	Substance	He	NO <sub>2</sub>	H <sub>2</sub>	K <sub>2</sub> O	O <sub>2</sub>	CO <sub>2</sub>	Element	monatomic	covalent molecule	covalent molecule	<b>Ionic</b>	covalent molecule	covalent molecule							
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5b	C+E <small>Both for 1 mark</small>	Diatomic Molecule: Two atoms joined together in a molecule: <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">Substance</td> <td style="width: 12.5%;">He</td> <td style="width: 12.5%;">NO<sub>2</sub></td> <td style="width: 12.5%;">H<sub>2</sub></td> <td style="width: 12.5%;">K<sub>2</sub>O</td> <td style="width: 12.5%;">O<sub>2</sub></td> <td style="width: 12.5%;">CO<sub>2</sub></td> </tr> <tr> <td>Molecule</td> <td>monoatomic</td> <td>triatomic</td> <td><b>diatomic</b></td> <td>Ionic ∴ no molecules</td> <td><b>diatomic</b></td> <td>triatomic</td> </tr> </table>	Substance	He	NO <sub>2</sub>	H <sub>2</sub>	K <sub>2</sub> O	O <sub>2</sub>	CO <sub>2</sub>	Molecule	monoatomic	triatomic	<b>diatomic</b>	Ionic ∴ no molecules	<b>diatomic</b>	triatomic														
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5c	B	Nitrogen and oxygen react to form nitrogen dioxide using the energy in lightning sparks: $\text{N}_2 + 2\text{O}_2 \longrightarrow 2\text{NO}_2$																												
5d	E	Oxygen is required for any substance to burn/combust.																												
6a	C	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">Compound</td> <td style="width: 12.5%;">ammonium sulphate</td> <td style="width: 12.5%;">sodium sulphate</td> <td style="width: 12.5%;">barium sulphate</td> <td style="width: 12.5%;">zinc sulphate</td> <td style="width: 12.5%;">copper sulphate</td> <td style="width: 12.5%;">magnesium sulphate</td> </tr> <tr> <td>Solubility</td> <td>soluble</td> <td>soluble</td> <td><b>insoluble</b></td> <td>soluble</td> <td>soluble</td> <td>soluble</td> </tr> </table>	Compound	ammonium sulphate	sodium sulphate	barium sulphate	zinc sulphate	copper sulphate	magnesium sulphate	Solubility	soluble	soluble	<b>insoluble</b>	soluble	soluble	soluble														
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6b	A	Ammonium sulphate contains the elements: nitrogen, hydrogen, sulphur and oxygen <ul style="list-style-type: none"> <li>Fertilisers are soluble compounds containing nitrogen, phosphorus or potassium</li> </ul>																												
7	B	<input checked="" type="checkbox"/> A oxygen relights a glowing split <input checked="" type="checkbox"/> B ammonia turns damp pH paper blue <input checked="" type="checkbox"/> C hydrogen burns with a pop <input checked="" type="checkbox"/> D carbon dioxide turns lime water milky																												
8	B,C <small>1 mark each</small>	<input checked="" type="checkbox"/> A glucose is covalent and does not complete the circuit <input checked="" type="checkbox"/> B sodium chloride is ionic so a solution completes the circuit and bulb lights <input checked="" type="checkbox"/> C copper metal is a conductor which completes the circuit and bulb lights <input checked="" type="checkbox"/> D sulphur is a non-metal and non-conductor so does not complete the circuit																												



Question	Answer	Chemistry Covered																								
9a	Number of positive charges equal the number of negative charges	Atoms are neutral because: Number of protons = number of electrons (Positive charges) (Negative charges)																								
9b	<table border="1"> <tr> <td></td> <td>non-metal</td> <td>non-metal</td> </tr> <tr> <td>reactive</td> <td></td> <td>unreactive</td> </tr> </table>		non-metal	non-metal	reactive		unreactive	<table border="1"> <tr> <td>Family</td> <td>Alkali Metal</td> <td>Halogen</td> <td>Noble Gases</td> </tr> <tr> <td>Group</td> <td>Group 1</td> <td>Group 7</td> <td>Group 0</td> </tr> <tr> <td>Metal/Non-Metal</td> <td>Metals</td> <td>Non-Metals</td> <td>Non-Metals</td> </tr> <tr> <td>Reactivity</td> <td>Reactive</td> <td>Reactive</td> <td>Very Unreactive</td> </tr> </table>	Family	Alkali Metal	Halogen	Noble Gases	Group	Group 1	Group 7	Group 0	Metal/Non-Metal	Metals	Non-Metals	Non-Metals	Reactivity	Reactive	Reactive	Very Unreactive		
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10a	$N_2H_4$ or $H_4N_2$	Problem Solving question																								
10b	covalent bonds	$N_2H_4$ is covalent as it only contains non-metals in the compound.																								
10c	answer showing:	Hydrazine $\longrightarrow$ Ammonia + Nitrogen + Hydrogen																								
11a	bar chart containing:	<table border="1"> <tr> <td><math>\frac{1}{2}</math>mark</td> <td><math>\frac{1}{2}</math>mark</td> <td>1mark</td> </tr> <tr> <td>vertical scale + label/unit</td> <td>correct labelling of bars</td> <td>bars drawn correctly</td> </tr> </table>	$\frac{1}{2}$ mark	$\frac{1}{2}$ mark	1mark	vertical scale + label/unit	correct labelling of bars	bars drawn correctly																		
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11b	one answer from:	<table border="1"> <tr> <td>kills plants</td> <td>kills marine life</td> <td>speeds up metal corrosion</td> <td>damages carbonate rocks</td> </tr> </table>	kills plants	kills marine life	speeds up metal corrosion	damages carbonate rocks																				
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12a	C	Test Tube C has the only permanent colour change $\therefore$ chemical reaction Test tube B has physical changes (melting and freezing)																								
12b	Glucose	Glucose, Maltose and Fructose all react with Benedict's Solution to give the colour change: blue $\longrightarrow$ brick red																								
13a	Respiration	Aerobic Respiration: glucose + oxygen $\longrightarrow$ carbon dioxide + water																								
13b	Water	Photosynthesis: $6CO_2 + 6H_2O \xrightarrow[\text{chlorophyll}]{\text{light}} C_6H_{12}O_6 + 6O_2$ <p style="text-align: center;">carbon dioxide                  water                                  glucose                                  oxygen</p>																								
13c	383-394	<table border="1"> <tr> <td>Year</td> <td>1975</td> <td>1985</td> <td>1995</td> <td>2005</td> <td>2015</td> </tr> <tr> <td>Level of <math>CO_2</math></td> <td>330</td> <td>345</td> <td>358</td> <td>374</td> <td>-</td> </tr> <tr> <td>Difference</td> <td></td> <td>15</td> <td>13</td> <td>16</td> <td>(13-16)</td> </tr> <tr> <td>Estimate</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>387-390</td> </tr> </table>	Year	1975	1985	1995	2005	2015	Level of $CO_2$	330	345	358	374	-	Difference		15	13	16	(13-16)	Estimate	-	-	-	-	387-390
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14b	ore	Ores are chemicals from which metals can be extracted e.g. metal oxides																								
15a(i)	Not broken down by bacteria	Non-biodegradable materials last a long time as they are not broken down by bacteria in the environment i.e. will not rot/decay/decompose.																								
15a(ii)	Diagram showing the following product:	<p style="text-align: center;">ethene</p> $\begin{array}{cccccc} H & H & H & H & H & H \\   &   &   &   &   &   \\ C & = & C & + & C & = & C & + & C & = & C \\   &   &   &   &   &   \\ H & H & H & H & H & H \end{array}$ <p style="text-align: center;"><math>\downarrow</math></p> <p style="text-align: center;">poly(ethene)</p> $\begin{array}{cccccc} H & H & H & H & H & H \\   &   &   &   &   &   \\ - & C & - & C & - & C & - & C & - & C & - & C & - \\   &   &   &   &   &   \\ H & H & H & H & H & H \end{array}$																								
15b	increases	The trend is of an increase in polythene (despite small decrease in 2003)																								
16a	no air/oxygen present	Boiling water removes any air dissolved in the water. The layer of oil prevents any air dissolving back into the boiled water.																								



16b(i)	$Fe^{2+}$	Ion	Effect on Ferroxy Indicator
		$Fe^{2+}$	Turns ferroxy indicator blue
		$OH^-$	Turns ferroxy indicator pink
16b(ii)	Mg gives sacrificial protection to iron	<p>Magnesium is higher up electrochemical series than iron</p> <ul style="list-style-type: none"> <li>magnesium sacrificially protects iron from rusting</li> <li>electrons flow from magnesium to iron</li> <li>magnesium provides electrons</li> <li>magnesium is more reactive</li> </ul>	
17a	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin: 2px;">water</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">carbon dioxide</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">ethanol</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">bacteria</div> </div>	Problem Solving: Transfer of Information from written passage to flow chart	
17b(i)	answer to include:	<p>Add pH paper or Universal Indicator</p> <ul style="list-style-type: none"> <li>match colour with pH chart</li> <li>read matching pH number to colour</li> </ul>	
17b(ii)	Any pH below 7	pH must be below 7 but vinegar is a weak acid so pH is in 3-6 range	
17c	increases	Lemon juice is an acid with a pH below 7. Diluting lemon juice with water will increase the pH until it reaches pH=7	
18a	Coal or natural gas	There are three fossil fuels: coal, oil and natural gas. Peat is acceptable.	
18b(i)	Gases	Butane has bpt. of $-1^{\circ}C$ . Gases have a boiling range up to $20^{\circ}C$	
18b(ii)	Brown	At $250^{\circ}C$ , gas oils are separated from crude oil (top diagram) Gas Oils are Brown (Lower table)	
19a(i)	5	Total volume must be the same in each experiment at $25cm^3$	
19a(ii)	Experiment 2 is slower	<p>Experiment 2 is slower than experiment 1 as it has less concentrated acid.</p> <ul style="list-style-type: none"> <li>the lower the concentration, the slower the reaction</li> </ul>	
19b	burns with a pop	Hydrogen gas burns with a pop	
20a(i)	$C_4H_6$ or $H_6C_4$	<p>Butyne is an alkyne with general formula: <math>C_nH_{2n-2}</math></p> <p>For butyne: <math>n=4 \therefore 2n-2 = (2 \times 4) - 2 = 8 - 2 = 6</math></p>	
20a(ii)	aromatic	$C_6H_6$ belongs to general formula $C_nH_n \therefore C_6H_6$ is aromatic	
20b	$  \begin{array}{ccccccc}  & H & H & H & H & H & \\  &   &   &   &   &   & \\  H & - C & - C & - C & - C & - C & - H \\  &   &   &   &   &   & \\  & H & H & H & H & H &   \end{array}  $	<h2 style="margin: 0;">Pentane</h2> <div style="display: flex; justify-content: center; align-items: center; gap: 20px;"> <div style="text-align: center;"> <span style="font-size: 2em;">}</span> 5 carbons         </div> <div style="text-align: center;"> <span style="font-size: 2em;">}</span> all C-C single bonds         </div> </div>	
20c	decolourises bromine solution	Alkenes are unsaturated. Unsaturated compounds decolourise bromine solution quickly as the bromine molecule adds across the $C=C$ double bond.	
21a(i)	electrolyte	Electrolytes are ionic compounds which complete a circuit as they allow ions to move between electrodes to balance the movement of charge.	
21a(ii)	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin: 2px;">copper</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">zinc</div> <div style="border: 1px solid black; padding: 2px; margin: 2px;">wires</div> </div>	<p>Electrons always flow from metals higher in the electrochemical series to metals lower in the electrochemical series <math>\therefore</math> zinc to copper</p> <p>Electrons flow through the wires, ions flow through the solution/paste.</p>	
21b	Chemicals run out	The chemical reaction in a cell which produces electricity will stop when one or both chemicals (reactants) in the cell runs out	

