



JABchem



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Past Papers

Standard Grade

General

Chemistry

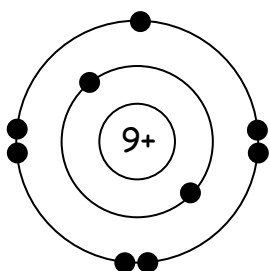
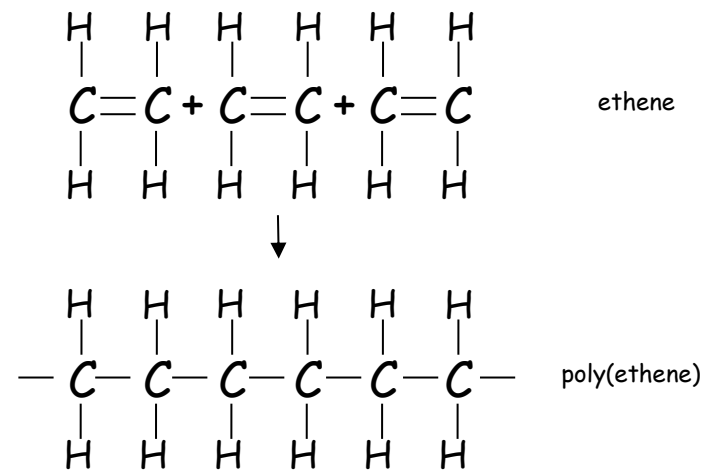
2001

Marking Scheme

2001 Standard Grade Chemistry General Marking Scheme

Question	Answer	Chemistry Covered																																			
1a	C	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Symbol</td> <td>Kr</td> <td>Po</td> <td>K</td> <td>P</td> <td>Pt</td> <td>Pb</td> </tr> <tr> <td>Element</td> <td>krypton</td> <td>polonium</td> <td>potassium</td> <td>phosphorus</td> <td>platinum</td> <td>lead</td> </tr> <tr> <td>Discovery</td> <td>1898</td> <td>1898</td> <td>1807</td> <td>1669</td> <td>1735</td> <td>ancient</td> </tr> </table>	Symbol	Kr	Po	K	P	Pt	Pb	Element	krypton	polonium	potassium	phosphorus	platinum	lead	Discovery	1898	1898	1807	1669	1735	ancient														
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Discovery	1898	1898	1807	1669	1735	ancient																															
1b	A+B <small>Both for 1 mark</small>																																				
1c	E	Transition metals like platinum are found in catalytic converters in cars																																			
2a	D	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>A</td> <td>Benedict's Solution</td> <td>Turns brick red in the presence of reducing sugars e.g. glucose</td> </tr> <tr> <td>B</td> <td>Bromine Solution</td> <td>Decolourises in the presence of unsaturated C=C double bonds</td> </tr> <tr> <td>C</td> <td>Ferroxyl Indicator</td> <td>Turn blue in the presence of Fe²⁺ ions</td> </tr> <tr> <td>D</td> <td>Iodine Solution</td> <td>Turns blue/black in the presence of starch</td> </tr> <tr> <td>E</td> <td>Lime Water</td> <td>Turns milky in the presence of carbon dioxide</td> </tr> </table>	A	Benedict's Solution	Turns brick red in the presence of reducing sugars e.g. glucose	B	Bromine Solution	Decolourises in the presence of unsaturated C=C double bonds	C	Ferroxyl Indicator	Turn blue in the presence of Fe ²⁺ ions	D	Iodine Solution	Turns blue/black in the presence of starch	E	Lime Water	Turns milky in the presence of carbon dioxide																				
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3c	B																																				
4a	C	Galvanising: Coating iron in zinc to provide sacrificial protection to the iron																																			
4b	E	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Answer</td> <td>A</td> <td>B</td> <td>C</td> <td>D</td> <td>E</td> <td>F</td> </tr> <tr> <td>Substance</td> <td>Copper</td> <td>Magnesium</td> <td>Zinc</td> <td>Brass</td> <td>Sodium</td> <td>Steel</td> </tr> <tr> <td>Type</td> <td>Element</td> <td>Element</td> <td>Element</td> <td>Alloy</td> <td>Element</td> <td>Alloy</td> </tr> <tr> <td>Flame Colour</td> <td>blue-green</td> <td>Not listed in data booklet</td> <td>Not listed in data booklet</td> <td>Not listed in data booklet</td> <td>yellow</td> <td>Not listed in data booklet</td> </tr> </table>	Answer	A	B	C	D	E	F	Substance	Copper	Magnesium	Zinc	Brass	Sodium	Steel	Type	Element	Element	Element	Alloy	Element	Alloy	Flame Colour	blue-green	Not listed in data booklet	Not listed in data booklet	Not listed in data booklet	yellow	Not listed in data booklet							
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4c	D+F <small>Both for 1 mark</small>																																				
5a	B	<p>Addition reactions involve the adding of a molecule across a C=C double bond</p> <p>Molecules which can add across a C=C double bond:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>H₂</td> <td>Br₂</td> <td>Cl₂</td> <td>F₂</td> <td>I₂</td> <td>H₂O</td> <td>HCl</td> <td>HBr</td> <td>HF</td> <td>HI</td> </tr> <tr> <td colspan="5" style="text-align: center;">One product formed</td> <td colspan="5" style="text-align: center;">Can produce two products depending on structure</td> </tr> </table>	H ₂	Br ₂	Cl ₂	F ₂	I ₂	H ₂ O	HCl	HBr	HF	HI	One product formed					Can produce two products depending on structure																			
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5b	A	<p>Neutralisation reactions occur when an acid and a base react to form water.</p> <p style="text-align: center;"> acid + metal carbonate → salt + water + carbon dioxide </p>																																			
6a	B	<p>Ammonia is an alkaline gas which turns damp pH paper blue:</p> <p style="text-align: center;">$\text{NH}_3 + \text{H}_2\text{O} \rightarrow \text{NH}_4^+ + \text{OH}^-$</p>																																			
6b	A	Hydrocarbons are compounds which contain the elements carbon and hydrogen only. Methane has the formula CH ₄ and is a hydrocarbon.																																			
6c	D	<p style="text-align: center;"> carbon dioxide + water $\xrightarrow[\text{light}]{\text{chlorophyll}}$ glucose + oxygen $6\text{CO}_2 + 6\text{H}_2\text{O} \longrightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$ </p>																																			
6d	E+F <small>Both for 1 mark</small>	A spark is required to combine nitrogen and oxygen in air to form NO ₂ . Large amount of energy to break N≡N triple bond before joining up with oxygen.																																			
7	B,C <small>1 mark each</small>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> A both gold and silver are transition metals <input checked="" type="checkbox"/> B gold and silver are both metals and are conductors of electricity <input checked="" type="checkbox"/> C gold and silver are both unreactive and found uncombined in crust <input checked="" type="checkbox"/> D neither gold or silver react with dilute acid <input checked="" type="checkbox"/> E neither gold or silver are more reactive than copper 																																			



Question	Answer	Chemistry Covered														
8a		The 1 st shell can hold a maximum of 2 electrons The 2 nd shell can hold a maximum of 8 electrons.														
8b	no. of protons equals no. of electrons	Atoms are neutral because they have an equal number of positive charges (protons) and number of negative of negative charges (electrons)														
9a(i)	<table border="1" data-bbox="191 504 462 604"> <tr><td>pH below 7</td></tr> <tr><td>pH above 7</td></tr> </table>	pH below 7	pH above 7	Carbon is a non-metal and sodium is a metal. <ul style="list-style-type: none"> Carbon Dioxide is a non-metal oxide and forms an acid when dissolved in water Sodium Oxide is a metal oxide and forms an alkali when dissolved in water 												
pH below 7																
pH above 7																
9a(ii)	Al ₂ O ₃ is insoluble	Any substance which is insoluble in water cannot have a pH value														
9b	Na + O ₂ → Na ₂ O	$\text{Na} + \text{O}_2 \rightarrow \text{Na}_2\text{O}$ <p>Sodium is a metal so the formula is Na Oxygen is a diatomic element Formula is worked out by the cross-over rule</p>														
10a	diagram showing the product:	 <p style="text-align: right;">ethene</p> <p style="text-align: right;">poly(ethene)</p>														
10b	thermoplastic	<table border="1" data-bbox="702 1243 1292 1310"> <tr><td>Thermoplastic</td><td>Will reshape/melt on heating</td></tr> <tr><td>Thermosetting</td><td>Do not reshape/melt on heating</td></tr> </table>	Thermoplastic	Will reshape/melt on heating	Thermosetting	Do not reshape/melt on heating										
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10c	bar chart containing:	<table border="1" data-bbox="590 1321 1404 1388"> <tr> <td>½ mark vertical scale</td> <td>½ mark correct labelling of bars</td> <td>1 mark bars drawn correctly</td> </tr> </table>	½ mark vertical scale	½ mark correct labelling of bars	1 mark bars drawn correctly											
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11a	speeds up chemical reaction	A catalyst speeds up a chemical reaction but the catalyst is not used up in the reaction and can be fully recovered at the end of the reaction.														
11b	increasing temperature decreases %SO ₂ converted	Problem Solving: Interpreting a line graph and drawing a conclusion														
11c	SO ₂ dissolves to form acid rain	Sulphur dioxide and nitrogen dioxide both dissolve on rain water to make acid rain. <ul style="list-style-type: none"> SO₂ is formed from sulphur in fossil fuels being burned NO₂ is formed by sparking of nitrogen and oxygen in air 														
11d	table showing:	<table border="1" data-bbox="758 1668 1236 1892"> <thead> <tr> <th>Use of Sulphuric Acid</th> <th>%</th> </tr> </thead> <tbody> <tr><td>Fertilisers</td><td>32.0%</td></tr> <tr><td>Plastics</td><td>9.0%</td></tr> <tr><td>Detergents</td><td>10.0%</td></tr> <tr><td>Fibres</td><td>14.0%</td></tr> <tr><td>Paints</td><td>16.0%</td></tr> <tr><td>Other Uses</td><td>19.0%</td></tr> </tbody> </table>	Use of Sulphuric Acid	%	Fertilisers	32.0%	Plastics	9.0%	Detergents	10.0%	Fibres	14.0%	Paints	16.0%	Other Uses	19.0%
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12a	electrolysis	Passing electricity through molten or solution of an ionic compound. The compound breaks back down into its elements.														



12b	metal ions are positive	Metals always form positive ions. Non-metals form negative ions (except hydrogen)																														
12c	bubbles of gas	Chloride Cl^- ions move to the positive electrode and turn into chlorine gas $2\text{Cl}^- \longrightarrow \text{Cl}_2 + 2\text{e}^-$																														
12d	carbon (graphite) conducts electricity	Carbon (graphite) is the only non-metal which conduct's electricity																														
13a	oxygen	$4\text{Fe} + 3\text{O}_2 \longrightarrow 2\text{Fe}_2\text{O}_3$																														
13b	same final level	As air contains approx 20% oxygen, once all the oxygen is used up, no more rusting will take place even if you double the mass of iron wool.																														
13c	Fe^{3+}	$\begin{array}{ccccccc} \text{Fe} & \rightarrow & \text{Fe}^{2+} & + & 2\text{e}^- \\ \text{followed by} & & \text{Fe}^{2+} & \rightarrow & \text{Fe}^{3+} & + & \text{e}^- \end{array}$																														
14a(i)	Ostwald Process	Ammonia + Oxygen $\xrightarrow[\text{catalyst}]{\text{platinum}}$ Nitrogen Dioxide + Water Nitrogen Dioxide dissolves in Water to make Nitric Acid																														
14a(ii)	water																															
14b	fertiliser	Ammonium Nitrate (NH_4NO_3) is a soluble compound containing nitrogen and can be used as a fertiliser.																														
15a(i)	chemical reaction	A chemical reaction inside a battery produces the electricity																														
15a(ii)	batteries are portable	Cells/batteries are portable but run out when the chemicals in the battery are used up.																														
15b(i)	From left to right → (iron to copper)	Iron is higher up the electrochemical series than copper (p7 data booklet) Electrons always flow from the higher up metal to the lower down metal.																														
15b(ii)	higher voltage	The bigger the gap in the electrochemical series, the higher the voltage. <ul style="list-style-type: none"> Aluminium is higher up electrochemical series than iron Al/Cu cell has a bigger voltage than an Fe/Cu cell 																														
16a	40cm^3	Problem Solving: Reading Information from a line graph																														
16b	same final volume of gas given off	If the same conditions are used in both experiments (apart from the changing temperature) then the same volume of gas will be given off at the end of the reaction																														
16c	line is steeper at beginning	The gradient of the line is the rate of reaction. <ul style="list-style-type: none"> The steeper the line the faster the reaction 																														
16d	0.2g	Catalysts speed up reactions with being used up in the reaction <ul style="list-style-type: none"> Same mass of catalyst can be recovered at the end of the reaction 																														
17a	distillation	Distillation separates compounds with different boiling points																														
17b	petrol	<table border="1"> <thead> <tr> <th>Property</th> <th>Gases (camping gas)</th> <th>Naphtha (petrol)</th> <th>Kerosene (aircraft fuel)</th> <th>Gas Oils (lubricating oil)</th> <th>Residue (bitumen/tar)</th> </tr> </thead> <tbody> <tr> <td>Viscosity</td> <td>Low</td> <td colspan="3" style="text-align: center;">←————→</td> <td>High</td> </tr> <tr> <td>Evaporation</td> <td>Easily</td> <td colspan="3" style="text-align: center;">←————→</td> <td>Slowly</td> </tr> <tr> <td>Flammability</td> <td>High</td> <td colspan="3" style="text-align: center;">←————→</td> <td>Low</td> </tr> <tr> <td>Boiling Point</td> <td>Low</td> <td colspan="3" style="text-align: center;">←————→</td> <td>High</td> </tr> </tbody> </table>	Property	Gases (camping gas)	Naphtha (petrol)	Kerosene (aircraft fuel)	Gas Oils (lubricating oil)	Residue (bitumen/tar)	Viscosity	Low	←————→			High	Evaporation	Easily	←————→			Slowly	Flammability	High	←————→			Low	Boiling Point	Low	←————→			High
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18a(i)	two atoms bonded together	Diatomic molecules are molecules with 2 atoms bonded together in a molecule					
18a(ii)	covalent	Molecules always contain covalent bonding.					
18b(i)	increasing atomic number increases boiling point	Problem Solving: Drawing a conclusion from results in a table					
18b(ii)	308°C (answer above 184°C is accepted)	Halogen	Fluorine	Chlorine	Bromine	Iodine	Astatine
		Boiling Point	-188°C	-35°C	59°C	184°C	-
		Difference		153°C	94°C	125°C	(ave=124°C)
		Estimate	-	-	-	-	308°C



