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Past Papers

Standard Grade

General

Chemistry

2000

Marking Scheme


2000 Standard Grade Chemistry General Marking Scheme

Question	Answer	Chemistry Covered																																			
1a	A+F Both for 1 mark	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Element</td> <td>Chlorine</td> <td>Copper</td> <td>Oxygen</td> <td>Lithium</td> <td>Sulphur</td> <td>Bromine</td> </tr> <tr> <td>Group</td> <td>Group 7</td> <td>transition metal</td> <td>Group 6</td> <td>Group 1</td> <td>Group 6</td> <td>Group 7</td> </tr> <tr> <td>Discovery</td> <td>1774</td> <td>ancient</td> <td>1774</td> <td>1817</td> <td>ancient</td> <td>1826</td> </tr> </table>	Element	Chlorine	Copper	Oxygen	Lithium	Sulphur	Bromine	Group	Group 7	transition metal	Group 6	Group 1	Group 6	Group 7	Discovery	1774	ancient	1774	1817	ancient	1826														
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3	B	<p style="text-align: center;"> ← Magnesium Voltage higher than Zn+Cu ← Zinc ← Iron ← Tin } Voltage lower than Zn+Cu ← Lead ← Copper </p> <p>Lead/Copper cell would give smallest voltage as lead is closest to copper in electrochemical series.</p>																																			
4	C	<input checked="" type="checkbox"/> A Alkaline solutions have pH>7 and pH falls to 7 when water is added <input checked="" type="checkbox"/> B Solution becomes more dilute when water is added <input checked="" type="checkbox"/> C Alkaline solutions have pH>7 and pH falls to 7 when water is added <input checked="" type="checkbox"/> D pH falls to 7 when water is added																																			
5a	A+C Both for 1 mark	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Ending</th> <th>Meaning</th> <th>Example</th> </tr> </thead> <tbody> <tr> <td>-ide</td> <td>2 elements in compound</td> <td>Copper sulphide = copper + sulphur</td> </tr> <tr> <td>-ate</td> <td>2 elements in compound + oxygen</td> <td>Copper sulphate = copper + sulphur + oxygen</td> </tr> <tr> <td>-ite</td> <td>2 elements in compound + oxygen</td> <td>Sodium sulphite = sodium + sulphur + oxygen</td> </tr> </tbody> </table>	Ending	Meaning	Example	-ide	2 elements in compound	Copper sulphide = copper + sulphur	-ate	2 elements in compound + oxygen	Copper sulphate = copper + sulphur + oxygen	-ite	2 elements in compound + oxygen	Sodium sulphite = sodium + sulphur + oxygen																							
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5b	D	Ammonium carbonate has formula (NH ₄) ₂ CO ₃ and contains the element nitrogen																																			
6a	B	Water has the formula H ₂ O and has an angular (bent) shape																																			
6b	A+D Both for 1 mark	Diatomic molecules contain two atoms bonded together by a covalent bonds																																			
6c	A+C Both for 1 mark	Elements contain one kind of atom only.																																			
7a	A+E Both for 1 mark	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Fair Test</th> <th>Factor</th> <th>A</th> <th>E</th> </tr> </thead> <tbody> <tr> <td>Factor which is changing:</td> <td>pH</td> <td>4</td> <td>11</td> </tr> <tr> <td rowspan="2">Factor kept constant:</td> <td>Temperature</td> <td>20°C</td> <td>20°C</td> </tr> <tr> <td>Cloth Material</td> <td>cotton</td> <td>cotton</td> </tr> </tbody> </table>	Fair Test	Factor	A	E	Factor which is changing:	pH	4	11	Factor kept constant:	Temperature	20°C	20°C	Cloth Material	cotton	cotton																				
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7b	E+F Both for 1 mark	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Acidic</td> <td style="text-align: center;">Neutral</td> <td style="text-align: center;">Alkaline</td> </tr> <tr> <td style="text-align: center;">pH less than 7</td> <td style="text-align: center;">pH = 7</td> <td style="text-align: center;">pH greater than 7</td> </tr> </table>	Acidic	Neutral	Alkaline	pH less than 7	pH = 7	pH greater than 7																													
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8a	E	Iron is made from iron ore in a blast furnace: Fe ₂ O ₃ + 3CO → 4Fe + 3CO ₂																																			
8b	C	<p style="text-align: center;"> Ammonia + Oxygen $\xrightarrow[\text{catalyst}]{\text{platinum}}$ Nitrogen Dioxide + Water Nitrogen Dioxide dissolves in Water to make Nitric Acid </p>																																			
9a	A,B 1 mark each	<input checked="" type="checkbox"/> A ethane and propane are both saturated as neither has a C=C double bond <input checked="" type="checkbox"/> B ethane and propane are both alkanes <input checked="" type="checkbox"/> C ethane and propane are alkanes with no C=C bond ∴ do not decolourise bromine water <input checked="" type="checkbox"/> D ethane has formula C ₂ H ₆ and propane has formula C ₃ H ₈ <input checked="" type="checkbox"/> E ethane and propane are alkanes ∴ neither has C=C double bonds																																			
9b	C,E 1 mark each	<input checked="" type="checkbox"/> A propene is unsaturated as it contains s C=C double bond <input checked="" type="checkbox"/> B propene is an alkene not an alkane <input checked="" type="checkbox"/> C propene decolourises bromine water but propane does not <input checked="" type="checkbox"/> D propene has formula C ₃ H ₆ <input checked="" type="checkbox"/> E propene has a C=C double bond but propane has only C-C single bonds																																			



Question	Answer	Chemistry Covered				
		Thermoplastic	Will reshape/melt on heating			
10a	thermoplastic	Thermosetting	Do not reshape/melt on heating			
10b	production of PVC increases	Problem Solving: Interpreting data in line graph				
10c	table showing:	Use of PVC		Property		
		Bottles		Strength		
		Protective Clothing		Water resistance		
		Food Containers		Chemical resistance		
		Plugs & Cables		Electrical resistance		
11a	sample B	Water Sample B requires the most soap (30drops) to produce a lather. This means water sample B contains the hardest water				
11b	boiling water reduces hardness	For each sample of water, less soap is required to produce a lather after boiling compared to water before water. Hardness must reduce during boiling.				
12a	oxygen	All substances use up oxygen as they burn.				
12b	carbon dioxide water	Candle wax is a hydrocarbon ∴ candle wax only contains carbon and hydrogen <ul style="list-style-type: none"> carbon burns to form carbon dioxide (turns lime water milky) hydrogen burns to form water (condenses in test tube A) 				
12c	cold surface needed for condensation to form	Water freezes at 0°C and boils at 100°C. Water moisture in the gases released by the burning candle will condense back to liquid water on the cold glass surface.				
13a	White Moss	Problem Solving: Interpreting graph				
13b	acid rain	Sulphur dioxide and nitrogen dioxide form acid rain when these gases are released into the atmosphere. This rain may end up in a loch.				
13c	4.8 - 5.8	The pH must be below 5.8 if there are no trout in the loch. pH must be above 4.8 if Perch are to live there.				
14a	halogens	Group	1	7	0	Middle block
		Name	Alkali metals	Halogen	Noble gases	Transition metals
14b	glows very brightly	The halogens get more and more reactive as you go up group 7. Magnesium fluoride should be reacting faster than magnesium chloride				
14c	$Mg + Br_2 \rightarrow MgBr$	$Mg + Br_2 \rightarrow MgBr$ <p>magnesium is a metal so the formula is Mg bromine is a diatomic element Formula is worked out by the cross-over rule</p>				
15a(i)	no oxygen/air present	Corrosion/rusting can only take place if both oxygen and water are present. If either oxygen or water is removed, there is no corrosion/rusting				
15a(ii)	salt speeds up corrosion	Salt increases the rate of corrosion as the ions help to complete the circuit.				
15b(i)	Fe^{2+}	Ferroxyl indicator turns blue in the presence of Fe^{2+} ions Ferroxyl indicator turns pink in the presence of OH^- ions				
15b(ii)	magnesium sacrificially protects iron	Attaching a metal to a metal higher up the electrochemical series will protect the lower down metal from corrosion. <ul style="list-style-type: none"> The higher metal oxidises and passes on the electrons to protect the lower down metal. 				



16a	answer to include:	Put pH paper into substance being tested. Match the colour on the pH paper against the pH chart colours and convert this colour into a pH value.										
16b	Fizz Alive	The lower the pH, the more acidic the solution is. Fizz Alive has lowest pH so is the most acidic and could cause tooth decay.										
16c(i)	it is a sugar or it is sweet	Fructose is a monosaccharide sugar with the formula $C_6H_{12}O_6$. Like all sugars, it has a sweet taste.										
16c(ii)	carbon, hydrogen & oxygen	carbohydrate 										
16d(i)	alloys	Alloys are mixtures of metals or sometimes metals with non-metals in them: <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>bronze</td> <td>amalgam</td> <td>stainless steel</td> <td>steel</td> <td>brass</td> <td>cupronickel</td> </tr> </table>	bronze	amalgam	stainless steel	steel	brass	cupronickel				
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16d(ii)	bar chart containing:	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">$\frac{1}{2}$mark vertical scale</td> <td style="text-align: center;">$\frac{1}{2}$mark correct labelling of bars</td> <td style="text-align: center;">1mark bars drawn correctly</td> </tr> </table>	$\frac{1}{2}$ mark vertical scale	$\frac{1}{2}$ mark correct labelling of bars	1mark bars drawn correctly							
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17a	neutralisation	acid + metal carbonate \rightarrow salt + water + carbon dioxide										
17b	carbon dioxide	sulphuric acid + zinc carbonate \rightarrow zinc sulphuric + water + carbon dioxide										
17c	all acid is neutralised	Zinc carbonate is added to sulphuric acid and neutralises the acid. If excess zinc carbonate is added to the acid, all the acid will be neutralised. The excess zinc carbonate is insoluble in the soluble and can be removed by filtration.										
18a	electrolysis	Passing electricity through molten or solution of an ionic compound. The compound breaks back down into its elements.										
18b	ions not free to move when solid	In the solid state, ionic compounds do not conduct electricity as its ions are not free to move.										
18c	lithium metal conducts	The lithium metal produced by the molten electrolysis could conduct electricity between the electrodes even after the molten lithium chloride freezes back to a solid.										
19a	nitrogen and carbon dioxide	$2NO + 2CO \rightarrow N_2 + 2CO_2$ <small>oxide of nitrogen carbon monoxide nitrogen carbon dioxide</small>										
19b	platinum	Transition metals like platinum are used in catalytic converters in cars										
19c	use unleaded petrol	Servicing an engine regularly will reduce pollution from the engine. Unleaded petrol does not release lead into the atmosphere										
20a	zinc	Galvanising: a coating of zinc to sacrificially protect iron underneath										
20b(i)	addition polymerisation	Addition polymers like poly(tetrafluoroethene) is made when C=C double bonds open out to form a long chain of C-C singles bonds										
20b(ii)	tetrafluoroethene	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Monomer</td> <td>ethene</td> <td>propene</td> <td>chloroethene</td> <td>tetrafluoroethene</td> </tr> <tr> <td>Polymer</td> <td>poly(ethene)</td> <td>poly(propene)</td> <td>poly(chloroethene)</td> <td>poly(tetrafluoroethene)</td> </tr> </table>	Monomer	ethene	propene	chloroethene	tetrafluoroethene	Polymer	poly(ethene)	poly(propene)	poly(chloroethene)	poly(tetrafluoroethene)
Monomer	ethene	propene	chloroethene	tetrafluoroethene								
Polymer	poly(ethene)	poly(propene)	poly(chloroethene)	poly(tetrafluoroethene)								
21a	orange-red	Calcium gives a orange-red colour in a flame test.										
21b	damp pH paper turns blue	$NH_3 + H_2O \rightarrow NH_4^+ + OH^-$ <small>ammonia water ammonium hydroxide</small>										

