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Past Papers

Standard Grade

General

Chemistry

2008

Marking Scheme

2008 General	KU		PS	
	/30	%	/30	%
3	20+	67%	23+	77%
4	15+	50%	18+	60%
5	12+	40%	16+	53%
7	<12	<40%	<16	<53%

2008 Standard Grade Chemistry General Marking Scheme

Question	Answer	Chemistry Covered																																										
1a	B+D Both for 1 mark	Elements in the same group have similar chemical properties. Lithium and sodium are both alkali metals and are in Group 1																																										
1b	D	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <th>Answer</th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>F</th> </tr> <tr> <td>Element</td> <td>Nitrogen</td> <td>Lithium</td> <td>Aluminium</td> <td>Sodium</td> <td>Oxygen</td> <td>Platinum</td> </tr> <tr> <td>Date of Discovery</td> <td>1772</td> <td>1817</td> <td>1825</td> <td>1807</td> <td>1774</td> <td>1735</td> </tr> </table>	Answer	A	B	C	D	E	F	Element	Nitrogen	Lithium	Aluminium	Sodium	Oxygen	Platinum	Date of Discovery	1772	1817	1825	1807	1774	1735																					
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1c	F	Platinum is the catalyst for the Ostwald Process: $4\text{NH}_3 + 5\text{O}_2 \rightarrow 4\text{NO} + 6\text{H}_2\text{O}$																																										
1d	A+E Both for 1 mark	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <th>Answer</th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>F</th> </tr> <tr> <td>Element</td> <td>Nitrogen</td> <td>Lithium</td> <td>Aluminium</td> <td>Sodium</td> <td>Oxygen</td> <td>Platinum</td> </tr> <tr> <td>Type</td> <td>non-metal</td> <td>metal</td> <td>metal</td> <td>Metal</td> <td>non-metal</td> <td>metal</td> </tr> </table> <ul style="list-style-type: none"> • Covalent bonds form between non-metals atoms. 	Answer	A	B	C	D	E	F	Element	Nitrogen	Lithium	Aluminium	Sodium	Oxygen	Platinum	Type	non-metal	metal	metal	Metal	non-metal	metal																					
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2a	A+C Both for 1 mark	Diatomic molecules contain two atoms bonded together																																										
2b	E	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <th>Answer</th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> </tr> <tr> <td>Element</td> <td>hydrogen</td> <td>helium</td> <td>oxygen</td> <td>silicon</td> <td>carbon</td> </tr> <tr> <td>Formula</td> <td>H₂</td> <td>He</td> <td>O₂</td> <td>Si</td> <td>C</td> </tr> <tr> <td>Electron Arrangement</td> <td>1</td> <td>2</td> <td>2,6</td> <td>2,8,4</td> <td>2,4</td> </tr> </table>	Answer	A	B	C	D	E	Element	hydrogen	helium	oxygen	silicon	carbon	Formula	H ₂	He	O ₂	Si	C	Electron Arrangement	1	2	2,6	2,8,4	2,4																		
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2c	C	Both oxygen and water are required for rusting/corrosion to occur.																																										
3a	C	Metal X and metal Y must be different metals to produce a voltage in a cell.																																										
3b	B	The bigger the difference in the Electrochemical Series (p10 data booklet), the bigger the voltage. Magnesium/Copper has the biggest difference.																																										
4a	C+E Both for 1 mark	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <th>Answer</th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>F</th> </tr> <tr> <td>Hydrocarbon</td> <td>butene</td> <td>ethene</td> <td>methane</td> <td>hexene</td> <td>pentane</td> <td>propene</td> </tr> <tr> <td>Homologous Series</td> <td>alkene</td> <td>alkene</td> <td>alkane</td> <td>alkene</td> <td>alkane</td> <td>alkene</td> </tr> <tr> <td>General Formula</td> <td>C_nH_{2n}</td> <td>C_nH_{2n}</td> <td>C_nH_{2n+2}</td> <td>C_nH_{2n}</td> <td>C_nH_{2n+2}</td> <td>C_nH_{2n}</td> </tr> <tr> <td>Formula</td> <td>C₄H₈</td> <td>C₂H₄</td> <td>CH₄</td> <td>C₆H₁₂</td> <td>C₅H₁₂</td> <td>C₃H₆</td> </tr> <tr> <td>Boiling Point (°C)</td> <td>-6</td> <td>-104</td> <td>-162</td> <td>63</td> <td>36</td> <td>-48</td> </tr> </table>	Answer	A	B	C	D	E	F	Hydrocarbon	butene	ethene	methane	hexene	pentane	propene	Homologous Series	alkene	alkene	alkane	alkene	alkane	alkene	General Formula	C _n H _{2n}	C _n H _{2n}	C _n H _{2n+2}	C _n H _{2n}	C _n H _{2n+2}	C _n H _{2n}	Formula	C ₄ H ₈	C ₂ H ₄	CH ₄	C ₆ H ₁₂	C ₅ H ₁₂	C ₃ H ₆	Boiling Point (°C)	-6	-104	-162	63	36	-48
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4b	E																																											
4c	A																																											
5a	D	Galvanised iron has a coating of zinc metal																																										
5b	A	An intact layer of tin around iron will slow corrosion but when the iron underneath is exposed by scratching, the iron will sacrificially corrode to protect the tin making the iron rust faster.																																										
6	D	<input checked="" type="checkbox"/> A Oil 1 is the least viscous (thick) as falling time is the lowest <input checked="" type="checkbox"/> B Oil 4 is the most viscous (thick) as falling time is the highest <input checked="" type="checkbox"/> C Oil 2 is less viscous than oil 3 as oil 2 falling time is less than oil 3 <input checked="" type="checkbox"/> D Oil 4 is the most viscous (longest time) and oil 1 is the least viscous																																										
7a	E	Insoluble salts can be made by precipitation and separated by filtration																																										
7b	F	Fertilisers are soluble compounds containing at least one of the following elements: Nitrogen, Phosphorus or Potassium																																										
8	B	BH ₃ is a molecule with 4 atoms in it ∴ BH ₃ is tetra-atomic																																										
9	B,D 1 mark each	<div style="display: flex; justify-content: space-between;"> <div style="width: 60%;"> <input checked="" type="checkbox"/> A molten/liquid metals conduct <input checked="" type="checkbox"/> B Covalent liquids do not conduct <input checked="" type="checkbox"/> C Ionic solutions conduct <input checked="" type="checkbox"/> D Ionic solids do not conduct (ions cannot move) <input checked="" type="checkbox"/> E Solid metals conduct </div> <table border="1" style="width: 35%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2">Bonding</th> <th colspan="3">Conduction:</th> </tr> <tr> <th>Solid</th> <th>Liquid</th> <th>Solution</th> </tr> </thead> <tbody> <tr> <td>Metallic (metals only)</td> <td>✓</td> <td>✓</td> <td>-</td> </tr> <tr> <td>Covalent (non-metals only)</td> <td>x</td> <td>x</td> <td>x</td> </tr> <tr> <td>Ionic (metals + non-metals)</td> <td>x</td> <td>✓</td> <td>✓</td> </tr> </tbody> </table> </div>	Bonding	Conduction:			Solid	Liquid	Solution	Metallic (metals only)	✓	✓	-	Covalent (non-metals only)	x	x	x	Ionic (metals + non-metals)	x	✓	✓																							
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Question	Answer	Chemistry Covered												
10a	(fractional) distillation	Fractional distillation separates chemicals due to their different boiling points.												
10b	smaller molecules	Cracking: Larger, less useful saturated molecules are broken into smaller, more useful molecules (some of which are unsaturated)												
10c	aluminium + silicon + oxygen	<table border="1"> <tr> <td>-ide</td> <td>Compound contains the two named elements</td> </tr> <tr> <td>-ate</td> <td>Compound contains 3 elements (two named elements + oxygen)</td> </tr> <tr> <td>-ite</td> <td>Compound contains 3 elements (two named elements + oxygen)</td> </tr> </table>	-ide	Compound contains the two named elements	-ate	Compound contains 3 elements (two named elements + oxygen)	-ite	Compound contains 3 elements (two named elements + oxygen)						
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11a	burns with a pop	<table border="1"> <tr> <td>Gas</td> <td>Hydrogen</td> <td>Oxygen</td> <td>Carbon Dioxide</td> </tr> <tr> <td>Gas Test</td> <td>burns with a pop</td> <td>relights glowing splint</td> <td>turns lime water milky</td> </tr> </table>	Gas	Hydrogen	Oxygen	Carbon Dioxide	Gas Test	burns with a pop	relights glowing splint	turns lime water milky				
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11b	alkaline	<table border="1"> <tr> <td>Type of solution</td> <td>Acidic</td> <td>Neutral</td> <td>Alkaline</td> </tr> <tr> <td>Universal Indicator</td> <td>red</td> <td>green</td> <td>blue/purple</td> </tr> <tr> <td>pH</td> <td>pH less than 7</td> <td>pH = 7</td> <td>pH greater than 7</td> </tr> </table>	Type of solution	Acidic	Neutral	Alkaline	Universal Indicator	red	green	blue/purple	pH	pH less than 7	pH = 7	pH greater than 7
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11c	keeps water/air away from metal	Alkali metals in group 1 are all very reactive with water. Storing under oil keeps both air and water away from the metal and prevents chemical reaction.												
12a	carbon distillation sodium carbon monoxide	<u>Problem Solving</u> Information transfer from written passage to flow chart												
12b	alloys	Alloys are mixtures of metals (sometimes metals with non-metals)												
12c	zirconium (4%) other metals (20%) titanium (76%)	Problem Solving: Information transfer from written passage to pie chart calculation: % other metals = 100 - (76 + 4) = 20%												
13a(i)	glows very brightly	Magnesium is more reactive than zinc so the reaction would glow brighter than zinc												
13a(ii)	speed increases	Powdered zinc has a smaller particle size than lumps of zinc so powdered zinc reacts faster than lumps of zinc.												
13b	gold, platinum or mercury	Metals less reactive than silver will also be found uncombined in the Earth's crust.												
14a	carbohydrates	Glucose (C ₆ H ₁₂ O ₆) and sucrose (C ₁₂ H ₂₂ O ₁₁) are both carbohydrates as they contain carbon, hydrogen and oxygen. (NB both are sugars but sugar is given in question so not accepted as answer)												
14b(i)	fermentation	Fermentation: $\text{glucose} \longrightarrow \text{ethanol} + \text{carbon dioxide}$ $\text{C}_6\text{H}_{12}\text{O}_6 \longrightarrow 2\text{C}_2\text{H}_5\text{OH} + 2\text{CO}_2$												
14b(ii)	ethanol	Ethanol (C ₂ H ₅ OH) is the alcohol in alcoholic drinks												
15a	bar chart containing:	<table border="1"> <tr> <td>$\frac{1}{2}$ mark vertical scale</td> <td>$\frac{1}{2}$ mark correct labelling of bars & mass/mg on y-axis</td> <td>1 mark bars drawn correctly</td> </tr> </table>	$\frac{1}{2}$ mark vertical scale	$\frac{1}{2}$ mark correct labelling of bars & mass/mg on y-axis	1 mark bars drawn correctly									
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15b(i)	CO ₂	<table border="1"> <tr> <td>Prefix</td> <td>Mono-</td> <td>Di-</td> <td>Tri-</td> <td>Tetra</td> </tr> <tr> <td>Meaning</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> </table>	Prefix	Mono-	Di-	Tri-	Tetra	Meaning	1	2	3	4		
Prefix	Mono-	Di-	Tri-	Tetra										
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15b(ii)	lime water turns milky	<table border="1"> <tr> <td>Gas</td> <td>Hydrogen</td> <td>Oxygen</td> <td>Carbon Dioxide</td> </tr> <tr> <td>Gas Test</td> <td>Burns with a pop</td> <td>Relights glowing splint</td> <td>Turns lime water milky</td> </tr> </table>	Gas	Hydrogen	Oxygen	Carbon Dioxide	Gas Test	Burns with a pop	Relights glowing splint	Turns lime water milky				
Gas	Hydrogen	Oxygen	Carbon Dioxide											
Gas Test	Burns with a pop	Relights glowing splint	Turns lime water milky											
16a	parsnip	Largest amount of catalase would give the largest number of O ₂ bubbles												
16b	enzyme	Enzymes are biological catalysts which carry out chemical reactions in living organisms.												
16c	25°C 20cm ³ 1g	In a fair test, only one variable changes at the time. From question, concentration is the variable which is being altered. <ul style="list-style-type: none"> Volume of hydrogen peroxide stays at 20cm³ Temperature stays at 25°C Mass of vegetable stays at 1g 												



17a	chloroethene	<table border="1"> <tr> <td>monomer</td> <td>ethene</td> <td>propene</td> <td>chloroethene</td> <td>styrene</td> </tr> <tr> <td>polymer</td> <td>poly(ethene)</td> <td>poly(propene)</td> <td>poly(chloroethene)</td> <td>poly(styrene)</td> </tr> </table>	monomer	ethene	propene	chloroethene	styrene	polymer	poly(ethene)	poly(propene)	poly(chloroethene)	poly(styrene)								
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polymer	poly(ethene)	poly(propene)	poly(chloroethene)	poly(styrene)																
17b	it last a long time as it doesn't break down	Most plastics are non-biodegradable. They do not get broken down by bacteria and eventually disappear.																		
17c(i)	synthetic fibres are stronger	<table border="1"> <thead> <tr> <th>Fibre</th> <th>Mass to Break (g)</th> <th>Type of Fibre</th> </tr> </thead> <tbody> <tr> <td>Cotton</td> <td>600</td> <td>natural</td> </tr> <tr> <td>polyester</td> <td>1200</td> <td>synthetic</td> </tr> <tr> <td>Wool</td> <td>200</td> <td>natural</td> </tr> <tr> <td>Poly(chloroethene)</td> <td>1000</td> <td>synthetic</td> </tr> <tr> <td>Poly(propene)</td> <td>1100</td> <td>synthetic</td> </tr> </tbody> </table>	Fibre	Mass to Break (g)	Type of Fibre	Cotton	600	natural	polyester	1200	synthetic	Wool	200	natural	Poly(chloroethene)	1000	synthetic	Poly(propene)	1100	synthetic
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17c(ii)	natural	Natural fibres in table have range 200→600 ∴ new fibre is natural																		
18a	hydrogen sulphide + oxygen ↓ sulphur dioxide + water	$\text{H}_2\text{S} + \text{O}_2 \longrightarrow \text{SO}_2 + \text{H}_2\text{O}$ <p>hydrogen sulphide + oxygen → sulphur dioxide + water</p>																		
18b(i)	to speed up reaction or less energy/heat required	Catalysts speed up chemical reactions without being used up in the reaction.																		
18b(ii)	decreases percentage sulphur trioxide produced	As temperature increases, the percentage of sulphur dioxide decreases																		
19a	acid	Sulphuric acid is the electrolyte in a rechargeable lead-acid battery used in cars.																		
19b	2 volts	$6 \text{ cells} = 12\text{V} \therefore 1 \text{ cell} = \frac{12\text{V}}{6} = 2\text{V}$																		
19c	substance burned to give out energy	Fuels are burned to release energy (usually heat energy)																		
19d	carbon dioxide + water	Hydrocarbons: compounds containing hydrogen and carbon only <ul style="list-style-type: none"> hydrogen burns to form water (H₂O) carbon burns to form carbon dioxide (CO₂) in plentiful supply of air 																		
20a	lettuce	Lettuce is the only vegetable where the pH range does not cross pH=6.0																		
20b	Lime or base/alkali/carbonate	Lime is added to soil to neutralise acid in the soil and raise acidic soil pH towards pH=7 (neutral)																		
21a	any pH below 7	Fizzy drinks have CO ₂ dissolved in them <ul style="list-style-type: none"> CO₂ dissolved in water forms the weak acid carbonic acid Acids have a pH below 7 																		
21b	bigger world population or more food required	Bigger world population has meant that more food is required to be grown to feed this bigger population. Fertilisers in soil give the soil the essential elements (nitrogen, phosphorus and potassium) needed to grow additional crops.																		
21c	zinc chloride	$\text{Acid} + \text{Metal} \longrightarrow \text{Salt} + \text{hydrogen}$ <p>hydrochloric acid + zinc → zinc chloride + hydrogen</p> $2\text{HCl} + \text{Zn} \longrightarrow \text{ZnCl}_2 + \text{H}_2$																		

