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Past Papers

Standard Grade

General

Chemistry

2005

Marking Scheme

2005 General	KU		PS	
	/30	%	/30	%
3	18+	60%	19+	63%
4	13+	43%	15+	50%
5	10+	33%	12+	40%
7	<10	<33%	<12	<40%

2005 Standard Grade Chemistry General Marking Scheme

Question	Answer	Chemistry Covered																																										
1a	D	<table border="1" style="width: 100%; border-collapse: collapse;"> <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>zinc</td> <td>magnesium</td> <td>sulphur</td> <td>sodium</td> <td>carbon</td> <td>copper</td> </tr> <tr> <td>Symbol</td> <td>Zn</td> <td>Mg</td> <td>S</td> <td>Na</td> <td>C</td> <td>Cu</td> </tr> </table>	Answer	A	B	C	D	E	F	Element	zinc	magnesium	sulphur	sodium	carbon	copper	Symbol	Zn	Mg	S	Na	C	Cu																					
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<p>covalent compounds contain only non-metal atoms.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <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>zinc</td> <td>magnesium</td> <td>sulphur</td> <td>sodium</td> <td>carbon</td> <td>copper</td> </tr> <tr> <td>Metal/Non-metal</td> <td>metal</td> <td>metal</td> <td>non-metal</td> <td>metal</td> <td>non-metal</td> <td>metal</td> </tr> </table>	Answer	A	B	C	D	E	F	Element	zinc	magnesium	sulphur	sodium	carbon	copper	Metal/Non-metal	metal	metal	non-metal	metal	non-metal	metal																							
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1b	C+E Both for 1 mark																																											
1c	A	Zinc is used to protect iron by galvanising as zinc is higher up than iron and provided sacrificial protection to iron.																																										
2a	A+C Both for 1 mark	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>Fair Test</th> <th>Factor</th> <th>A</th> <th>C</th> </tr> <tr> <td>Factor which is changing:</td> <td>Particle Size</td> <td>Tablet</td> <td>Powder</td> </tr> <tr> <td>Factor kept constant:</td> <td>Temperature</td> <td>30°C</td> <td>30°C</td> </tr> </table>	Fair Test	Factor	A	C	Factor which is changing:	Particle Size	Tablet	Powder	Factor kept constant:	Temperature	30°C	30°C																														
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3a	B	$\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \longrightarrow 6\text{CO}_2 + 6\text{H}_2\text{O}$ <p style="text-align: center;">glucose + oxygen → carbon dioxide + water</p>																																										
3b	B	$\text{acid} + \text{metal carbonate} \longrightarrow \text{salt} + \text{water} + \text{carbon dioxide}$																																										
3c	E	sulphur dioxide dissolves in water to form (sulphurous) acid																																										
3d	C+D Both for 1 mark	$\text{N}_2 + 3\text{H}_2 \xrightleftharpoons{\text{Fe catalyst}} 2\text{NH}_3$ <p style="text-align: center;">Nitrogen + Hydrogen ⇌ Ammonia</p>																																										
4a	C	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>Answer</th> <th>Indicator</th> <th>Change</th> </tr> <tr> <td>A</td> <td>iodine solution</td> <td>turns blue/black in the presence of starch</td> </tr> <tr> <td>B</td> <td>lime water</td> <td>turns milky in the presence of carbon dioxide</td> </tr> </table>	Answer	Indicator	Change	A	iodine solution	turns blue/black in the presence of starch	B	lime water	turns milky in the presence of carbon dioxide																																	
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4c	B	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>F</td> <td>pH indicator</td> <td>pH indicator turns red in the presence of acid pH indicator turns blue/purple in the presence of alkali</td> </tr> </table>	F	pH indicator	pH indicator turns red in the presence of acid pH indicator turns blue/purple in the presence of alkali																																							
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5a	A+D Both for 1 mark	alkali in wasp sting is neutralised by acidic substances vinegar and orange juice are acidic (with a pH less than 7)																																										
5b	C	The most alkaline substance will have the highest pH (nearest to 14)																																										
6	D	<input checked="" type="checkbox"/> A - magnesium wire corrodes to protect iron nail due to sacrificial protection																																										
		<input checked="" type="checkbox"/> B - Nail corrodes at normal rate																																										
		<input checked="" type="checkbox"/> C - iron nail is protected from corroding by cathodic protection from the battery																																										
		<input checked="" type="checkbox"/> D - iron nail corrodes quicker to protect the copper wire due to sacrificial protection																																										
7a	A	<table border="1" style="width: 100%; border-collapse: collapse;"> <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>Name</td> <td>ethene</td> <td>propene</td> <td>methane</td> <td>butane</td> <td>hexene</td> <td>pentene</td> </tr> <tr> <td>Formula</td> <td>C₂H₄</td> <td>C₃H₆</td> <td>CH₄</td> <td>C₄H₁₀</td> <td>C₆H₁₂</td> <td>C₅H₁₀</td> </tr> <tr> <td>Homologous Series</td> <td>alkene</td> <td>alkene</td> <td>alkane</td> <td>alkane</td> <td>alkene</td> <td>alkene</td> </tr> <tr> <td>Member of Series</td> <td>1st</td> <td>2nd</td> <td>1st</td> <td>4th</td> <td>5th</td> <td>4th</td> </tr> <tr> <td>Boiling Pt (°C)</td> <td>-104</td> <td>-48</td> <td>-162</td> <td>-1</td> <td>63</td> <td>30</td> </tr> </table>	Answer	A	B	C	D	E	F	Name	ethene	propene	methane	butane	hexene	pentene	Formula	C ₂ H ₄	C ₃ H ₆	CH ₄	C ₄ H ₁₀	C ₆ H ₁₂	C ₅ H ₁₀	Homologous Series	alkene	alkene	alkane	alkane	alkene	alkene	Member of Series	1 st	2 nd	1 st	4 th	5 th	4 th	Boiling Pt (°C)	-104	-48	-162	-1	63	30
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7b	F																																											
7c	F																																											
8	B,E 1 mark each	<input checked="" type="checkbox"/> A - gold and silver are Transition Metals																																										
		<input checked="" type="checkbox"/> B - all metals conduct electricity																																										
		<input checked="" type="checkbox"/> C - Gold/silver are less reactive than copper (see electrochemical/reactivity Series)																																										
		<input checked="" type="checkbox"/> D - Gold and silver are not reactive enough to react with acids																																										
		<input checked="" type="checkbox"/> E - gold/silver are both unreactive enough to be found uncombined in Earth's Crust																																										

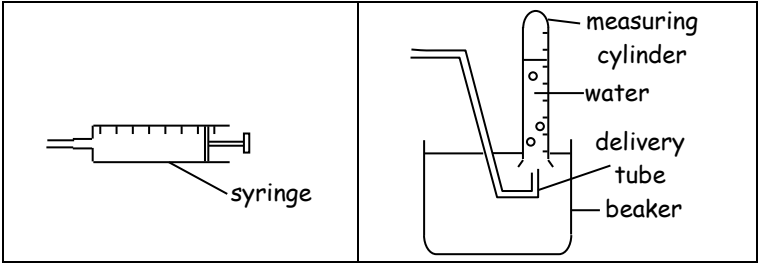


Question	Answer	Chemistry Covered																																																
9a	2 atoms joined by bond	Diatomic molecules are when two atoms are joined together by at least one chemical bond <ul style="list-style-type: none"> Diatomic Elements: H₂, N₂, O₂, F₂, Cl₂, Br₂, I₂ 																																																
9b	exothermic	<table border="1"> <tr> <td>Exothermic</td> <td>a reaction which releases heat</td> </tr> <tr> <td>Endothermic</td> <td>a reaction which takes in heat</td> </tr> </table>	Exothermic	a reaction which releases heat	Endothermic	a reaction which takes in heat																																												
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9c	a substance which speeds up a reaction	Catalysts speed up reactions but are not used up in the reaction. Same mass of catalyst left at end of reaction.																																																
10a(i)	halogens	<table border="1"> <tr> <td>Group</td> <td>1</td> <td>7</td> <td>0</td> <td>Between Groups 2+3</td> </tr> <tr> <td>Name</td> <td>alkali metals</td> <td>halogens</td> <td>noble gases</td> <td>transition metals</td> </tr> </table>	Group	1	7	0	Between Groups 2+3	Name	alkali metals	halogens	noble gases	transition metals																																						
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10a(ii)	same chemical properties (or same no. of outer electrons)	All elements in the same group have the same chemical properties and the same number of outer electrons																																																
10b	bar chart showing:	<table border="1"> <tr> <td>$\frac{1}{2}$ mark vertical scale</td> <td>$\frac{1}{2}$ mark correct labelling of bars</td> <td>1 mark bars drawn correctly</td> </tr> </table>	$\frac{1}{2}$ mark vertical scale	$\frac{1}{2}$ mark correct labelling of bars	1 mark bars drawn correctly																																													
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10c	calcium, iodine and 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	a compound of carbon and hydrogen only	Hydrocarbons contain the elements carbon + hydrogen only																																																
11b	petrol	<table border="1"> <tr> <th>Property</th> <th>Fraction A</th> <th>Fraction B</th> <th>Fraction C</th> <th>Fraction D</th> <th>Fraction E</th> </tr> <tr> <td>Name</td> <td>Refinery Gas</td> <td>Naphtha/Gasoline</td> <td>Kerosene</td> <td>Gas Oils</td> <td>Residue</td> </tr> <tr> <td>Use</td> <td>Camping Gas</td> <td>Petrol</td> <td>Aircraft Fuel</td> <td>Diesel</td> <td>Tar</td> </tr> <tr> <td>Chain Length</td> <td>Short</td> <td colspan="3" style="text-align: center;">←————→</td> <td>Long</td> </tr> <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> </table>	Property	Fraction A	Fraction B	Fraction C	Fraction D	Fraction E	Name	Refinery Gas	Naphtha/Gasoline	Kerosene	Gas Oils	Residue	Use	Camping Gas	Petrol	Aircraft Fuel	Diesel	Tar	Chain Length	Short	←————→			Long	Viscosity	Low	←————→			High	Evaporation	Easily	←————→			Slowly	Flammability	High	←————→			Low	Boiling Point	Low	←————→			High
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11c	C ₁₀ H ₂₀	Cracking splits molecules but if the C ₈ fragment is an alkane with the formula C ₈ H ₁₈ then there are not enough hydrogen atoms left for C ₁₀ fragment to be an alkane with formula C ₁₀ H ₂₂ so the alkene C ₁₀ H ₂₀ is formed instead. $C_{18}H_{38} \longrightarrow C_8H_{18} + C_{10}H_{20}$																																																
12a(i)	electrons	electrons travel through wires, ions travel through solutions.																																																
12a(ii)	voltage below 0.92V	tin/copper are closer together than zinc/copper on electrochemical series. Smaller gap on electrochemical series means smaller voltage																																																
12b	Better Portability or safer	Batteries are more portable and safer than mains electricity. However batteries run out and are hard to dispose of.																																																
13a	<table border="1"> <tr> <th>Alloy</th> <th>Use</th> </tr> <tr> <td>brass</td> <td>water tap</td> </tr> <tr> <td>solder</td> <td>joining metal pipes</td> </tr> <tr> <td>duralumin</td> <td>aeroplane frame</td> </tr> <tr> <td>steel</td> <td>cars and ships</td> </tr> </table>	Alloy	Use	brass	water tap	solder	joining metal pipes	duralumin	aeroplane frame	steel	cars and ships	<table border="1"> <tr> <td>$\frac{1}{2}$ mark table drawn</td> <td>$\frac{1}{2}$ mark suitable headings</td> <td>1 mark correct entries</td> </tr> </table>	$\frac{1}{2}$ mark table drawn	$\frac{1}{2}$ mark suitable headings	1 mark correct entries																																			
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13b(i)	Tin = 65%, Lead = 35%	problem solving question																																																
13b(ii)	conducts electricity	Circuit boards conduct electricity. Alloys conduct electricity due to metallic bonding.																																																



14a(i)	Addition or hydrogenation	Addition reactions add across a C=C double bond. Addition of hydrogen is also known as hydrogenation.			
14a(ii)	C ₄ H ₁₀	$ \begin{array}{cccc} \text{H} & \text{H} & & + \text{H}_2 \\ & & & \\ \text{H}-\text{C}-\text{C}-\text{C}=\text{C}-\text{H} & \longrightarrow & \text{H} & \text{H} & \text{H} & \text{H} \\ & & & & & \\ \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} \end{array} $			
14b(i)	poly(butene)	Addition Polymerisation: $\text{butene} \xrightarrow{\text{monomer}} \text{poly(butene)}$ polymer			
14b(ii)	does not decay (or longer lasting)	Plastics are non-biodegradable so last longer as they do not rust or break down.			
15a	The breaking up of a compound using electricity	Molten ionic compounds conduct by electrolysis			
15b	Ions are free to move	Solid Ionic compounds cannot conduct due to ions being unable to move freely. Molten and dissolved ionic compounds have ions free to move.			
15c	Chlorine	Cl ⁻ ions move to positive electrode where $2\text{Cl}^-(\text{l}) \longrightarrow \text{Cl}_2(\text{g})$			
15d	Reduced cost of heating or less energy required	High temperature required to melt ionic compounds so anything which reduces temperature to melt substance will save money.			
16a(i)	insoluble salt	If soluble Barium salt was used, it would dissolve and enter the body and poison the patient. Barium sulphate is insoluble.			
16a(ii)	Acid would neutralise barium carbonate	Once neutralised, barium chloride is soluble and would be absorbed by the body			
16b	BaCO ₃	Write down Valency below each element's symbol	Put in Cross-over Arrows	Follow arrows and cancel down to get formula	
		$ \begin{array}{cc} \text{Ba} & \text{CO}_3^{2-} \\ 2 & 2 \end{array} $	$ \begin{array}{cc} \text{Ba} & \text{CO}_3^{2-} \\ 2 & 2 \end{array} $	$ \text{BaCO}_3 $	
17a	carbon dioxide and water	Carbon in C ₂ H ₆ O ₂ burns to form CO ₂ , hydrogen in C ₂ H ₆ O ₂ burns to form H ₂ O: ethylene glycol + oxygen \longrightarrow carbon dioxide + water $2\text{C}_2\text{H}_6\text{O}_2 + 5\text{O}_2 \longrightarrow 4\text{CO}_2 + 6\text{H}_2\text{O}$			
17b	melts when heated	Thermoplastic	Melt/reshape on heating		
		Thermosetting	Do <u>not</u> melt/reshape on heating		
17c	salt increases rusting	Ionic compounds/salts increase rate of corrosion			
18a	chlorophyll	Chlorophyll in plants catalyses the chemical reaction of photosynthesis: carbon dioxide + water \longrightarrow glucose + oxygen $6\text{CO}_2 + 6\text{H}_2\text{O} \longrightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$			
18b(i)	The nearer the lamp the greater the number of bubbles	Problem Solving Question			
18b(ii)	one from:	size of plant	type of plant	same bulb	same wattage
		temperature	light intensity	brightness of bulb	number of plants



18c	Diagram showing one method from:	
19a	syringe or inverted test tube	Ammonia is lighter than air so will float up into an inverted test tube displacing the air in the test tube. Ammonia dissolves in water so should not be collected by bubbling through water
19b	turns moist pH paper blue	$\text{NH}_3 + \text{H}_2\text{O} \longrightarrow \text{NH}_4^+ + \text{OH}^-$ <p style="text-align: center;">ammonia ammonium hydroxide (alkali)</p>
19c(i)	nitrogen	3 essential elements for plants growth are Potassium, Nitrogen and Phosphorus
19c(ii)	increased population or more demand for food	As the planet's population increases, the population need more food to feed them hence more use of fertilisers to grow more food

