Past Papers

Standard Grade

General

Chemistry

2004

Marking Scheme

2004 General	KU		PS	
	/30	%	/30	%
3	20+	67%	18+	60%
4	15+	50%	14+	47%
5	12+	40%	11+	33%
7	<12	<40%	<11	<33%

2004 Standard Grade Chemistry General Marking Scheme

Question	Answer	Chemistry Covered
1a	B	
1b	E	
1c	A+F Both for 1 mark	

Element	Neon	Lithium	Chlorine	Oxygen	Copper	Argon
Group	Group 0 (Noble Gas)	Group 1 (Alkali Metal)	Group 7 (Halogen)	Group 6	Transition Metal	Group 0 (Noble Gas)
Melting Pt	-249°C	181°C	-101°C	-219°C	1085°C	-189°C

Noble Gases are very unreactive elements

Question	Answer	Chemistry Covered
2a	D	

Prefix	Meth-	Eth-	Prop-	But-	Pent-	Hex-	Hept-	Oct-
No of Carbon	1	2	3	4	5	6	7	8

Question	Answer	Chemistry Covered
2b	B+F Both for 1 mark	
2c	C	

Answer	A	B	C	D	E	F
Formula	CH_4	C_2H_4	C_6H_{14}	C_5H_{12}	C_3H_8	C_4H_8
General Formula	C_nH_{2n+2}	C_nH_{2n}	C_nH_{2n+2}	C_nH_{2n+2}	C_nH_{2n+2}	C_nH_{2n}
Family	Alkane	Alkene	Alkane	Alkane	Alkane	Alkene
Name	Methane	Ethene	Hexane	Pentane	Propane	Butene
Boiling Pt	-162°C	-104°C	69°C	36°C	-42°C	-6°C

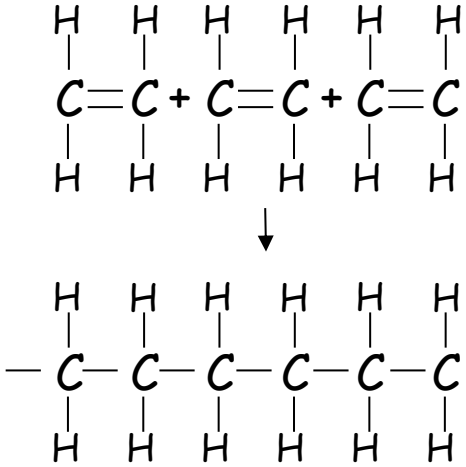
Question	Answer	Chemistry Covered
3a	C	Nitrogen + Hydrogen $\xrightarrow{\text{iron catalyst}}$ Ammonia
3b	E	

Sodium	Calcium	Magnesium	Zinc	Iron	Silver
Most reactive →					Least Reactive

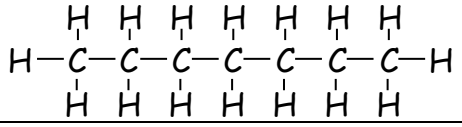
Question	Answer	Chemistry Covered
4a	C	All metals conduct electricity in the solid state. Non-metals do not conduct electricity except carbon (graphite)
4b	D+E Both for 1 mark	Fertilisers are soluble compounds containing one or more from the following elements: Nitrogen, Phosphorus and potassium
4c	A	All acids contain more of the hydrogen ion (H^+ ion)
5a	D	Air contains 79% nitrogen and 21% oxygen
5b	C+F Both for 1 mark	

Element	Oxygen	Hydrogen	Helium	Nitrogen	Chlorine	Xenon
Formula	O_2	H_2	He	N_2	Cl_2	Xe

Question	Answer	Chemistry Covered
6a	A	A: respiration: $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ B: cracking: breaking larger hydrocarbons into smaller, more useful hydrocarbons C: distillation: separation of two liquids with different boiling points D: filtration: separating residue (insoluble solid) in filter paper from filtrate (solution) E: photosynthesis: $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$ F: galvanising: zinc coating iron so iron is sacrificially protected by zinc
6b	C	
7a	A	Iron is made from iron ore in a blast furnace: $Fe_2O_3 + 3CO \longrightarrow 2Fe + 3CO_2$
7b	B	Silicon is the non-metal product of the reaction of magnesium & silicon dioxide
8a	A	Magnesium carbonate neutralises hydrochloric acid and excess magnesium carbonate is used to ensure all hydrochloric acid has been neutralised. The excess magnesium carbonate is insoluble in water and can be removed by filtration from the products of the reaction.
8b	C,E 1 mark each	☒ A Magnesium carbonate reacted and excess removed by filtration ☒ B All hydrochloric acid has been neutralised by magnesium carbonate ☑ C magnesium chloride is formed and dissolves in the solution ☒ D Carbon dioxide gas escapes into the atmosphere ☑ E Water is formed in the reaction and ends up in the flask

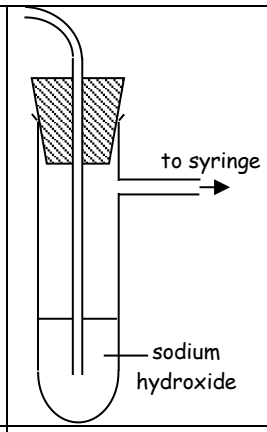
<table>
<tr><th>Question</th><th>Answer</th><th>Chemistry Covered</th></tr>
<tr><td>9a</td><td>burns to release energy</td><td>A fuel is a substance which releases energy (usually heat) when it is burned.</td></tr>
<tr><td>9b</td><td>Dead trees fall to bottom of swamp
Materials get covered up by mud
Layers of rock above provide pressure
Over millions of years turns into coal</td><td>
<table>
<tr><th>Step</th><th>How Coal is Made</th><th>How Crude Oil is Made</th></tr>
<tr><td>1</td><td>Dead trees fall to bottom of swamp</td><td>Dead sea organisms fall to bottom of sea</td></tr>
<tr><td>2</td><td>Materials get covered up by mud</td><td>Materials get covered up by sand</td></tr>
<tr><td>3</td><td>Layers of rock above provide pressure</td><td>Layers of rock above provide pressure</td></tr>
<tr><td>4</td><td>Over millions of years turns into coal</td><td>Over millions of years turns into coal</td></tr>
</table>
</td></tr>
<tr><td>9c</td><td>crude oil
or natural gas</td><td>Coal, Crude Oil and Natural Gas are fossil fuels.
Peat is an acceptable answer.</td></tr>
<tr><td>10a</td><td>Magnesium,
Aluminium or Zinc</td><td>Any metal from: Magnesium, Aluminium or Zinc.
Potassium, sodium, lithium and calcium would protect iron but are too reactive to work in practice.</td></tr>
<tr><td>10b</td><td>zinc</td><td>Galvanising: zinc coating used to sacrificially protect iron underneath</td></tr>
<tr><td>10c</td><td>prevents air or water getting to iron</td><td>Rusting/corrosion can be prevented by using a barrier over the iron to stop air and water touching the metal.
Painting, greasing, plastic coating and tin plating all provide barrier protection.</td></tr>
<tr><td>10d</td><td>any answer from:</td><td>
<table>
<tr><td>Bronze</td><td>Stainless steel</td><td>Brass</td></tr>
<tr><td>Amalgam</td><td>Solder</td><td>Cupronickel</td></tr>
</table>
</td></tr>
<tr><td>11a</td><td>man-made</td><td>Synthetic materials are not found in nature and are made by the chemical industry.</td></tr>
<tr><td>11b</td><td>diagram showing the following product:</td><td> 
ethene

poly(ethene)</td></tr>
<tr><td>11c</td><td>broken down by bacteria</td><td>Biodegradable materials can be broken down by living organisms like bacteria and will not pollute the environment by not breaking down.</td></tr>
<tr><td>12a</td><td>bleach & detergent</td><td>
<table>
<tr><td>acidic</td><td>neutral</td><td>alkaline</td></tr>
<tr><td>pH<7</td><td>pH=7</td><td>pH>7</td></tr>
</table>
</td></tr>
<tr><td>12b</td><td>bar chart containing:</td><td>
<table>
<tr><td>½mark
vertical scale</td><td>½mark
correct labelling of bars</td><td>1mark
bars drawn correctly</td></tr>
</table>
</td></tr>
<tr><td>13a</td><td>hydrogen
Unreacted Nitrogen & hydrogen
ammonia
ammonium nitrate</td><td>Problem Solving: Completing a flow chart from written information</td></tr>
</table>

<table>
<tr><td>13b</td><td>table showing:</td><td>
<table>
<tr><td>Use of Ammonia</td><td>Percentage</td></tr>
<tr><td>Fertilisers</td><td>80%</td></tr>
<tr><td>Nitric Acid</td><td>7%</td></tr>
<tr><td>Nylon</td><td>5%</td></tr>
<tr><td>Other uses</td><td>8%</td></tr>
</table>
</td></tr>
<tr><td>14a</td><td>magnesium, sulphur & oxygen</td><td>
<table>
<tr><th>Ending</th><th>Meaning</th><th>Example</th></tr>
<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>
</table>
</td></tr>
<tr><td>14b</td><td>solvent</td><td>
<table>
<tr><td>solution</td><td>a mixture formed when a solute dissolves in a solvent</td></tr>
<tr><td>solute</td><td>the substance that is dissolved</td></tr>
<tr><td>solvent</td><td>the liquid that does the dissolving</td></tr>
</table>
</td></tr>
<tr><td>14c(i)</td><td>precipitation</td><td>Chemical reaction where an insoluble substance is formed when two solutions are mixed</td></tr>
<tr><td>14c(ii)</td><td>barium sulphate</td><td>barium chloride + magnesium sulphate → magnesium chloride Soluble (dissolved in solution) + barium sulphate Insoluble (precipitate)</td></tr>
<tr><td>15a</td><td>to complete the circuit</td><td>The salt solution electrolyte completes the circuit as the ions move through the filter paper to balance the movement of electrons through the wires.</td></tr>
<tr><td>15b</td><td>nickel
↓
Copper
(through wires & ammeter)</td><td>Nickel is higher up the electrochemical series than copper.
Electrons always flow from the higher up metal to the lower metal</td></tr>
<tr><td>15c</td><td>any metal below copper</td><td>Any metal below copper in the electrochemical series will result in a change of direction of electron flow:
<table>
<tr><td>mercury</td><td>silver</td><td>gold</td><td>platinum</td></tr>
</table>
</td></tr>
<tr><td>15d</td><td>cells run out</td><td>Batteries are portable but run out when the chemicals in the battery are used up.</td></tr>
<tr><td>16a</td><td>diagram showing:</td><td>  </td></tr>
<tr><td>16b</td><td>C_4H_{10}</td><td>$C_7H_{16} \longrightarrow C_3H_6 + C_4H_{10}$
saturated → unsaturated + saturated</td></tr>
<tr><td>16c</td><td>propene</td><td>Cracking splits larger, less useful molecules into smaller, more useful molecules some of which are unsaturated (C=C double bonds)</td></tr>
<tr><td>16d</td><td>carbon or soot</td><td>As there is a very limited air supply in the test tube, there is no oxygen available to react with any carbon fragments left over from the cracking process.</td></tr>
<tr><td>17a(i)</td><td>speeds up chemical reaction</td><td>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.</td></tr>
<tr><td>17a(ii)</td><td>0.1g</td><td>Same mass of catalyst at beginning and end</td></tr>
<tr><td>17b</td><td>$50cm^3$ of 2mol/l hydrogen peroxide
0.1g manganese dioxide</td><td>In a fair test, only one variable can change at one time:

Question identifies TEMPERATURE as the variable which is changing
Temperature is increased from 25°C to 35°C
Volume of hydrogen peroxide solution must remain constant ($50cm^3$)
Concentration of hydrogen peroxide solution must remain constant (2mol/l)
Mass of manganese dioxide must remain constant (0.1g)

</td></tr>
</table>

18a		All gas must pass through the sodium hydroxide before entering the syringe B. • Tubing from syringe A must physically enter sodium hydroxide solution if all carbon dioxide is to be removed from the biogas • Methane gas is not removed by the sodium hydroxide solution to bubbles up and collects in syringe B
18b	$32cm^3$	Carbon dioxide (60%) is removed by sodium hydroxide Methane (40%) collects in syringe $\therefore$ 40% of $80cm^3 = \frac{40}{100} \times 80cm^3 = 32cm^3$
19a	iodine	starch turns blue/black in the presence of iodine solution
19b	ethanol	glucose $\xrightarrow[\text{(no air)}]{\text{enzymes}}$ ethanol + carbon dioxide $C_6H_{12}O_6 \longrightarrow 2C_2H_5OH + 2CO_2$
19c(i)	Increasing temperature decreases % alcohol	Problem Solving: Drawing a conclusion from a line graph
19c(ii)	12.5%	Problem Solving: Reading information from a line graph