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Past Papers

Standard Grade

General

Chemistry

2012

Marking Scheme

2012 General	KU		PS	
	/30	%	/30	%
3	17+	57%	20+	67%
4	11+	43%	14+	47%
5	9+	30%	11+	37%
7	<9	<30%	<11	<37%

2012 Standard Grade Chemistry General Marking Scheme

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

Answer	A	B	C	D	E	F
Element	Gold	Magnesium	Carbon	Nitrogen	Calcium	Iodine
Atomic Number	79	12	6	7	20	53
Formula	Au	Mg	C	N_2	Ca	I_2
Group Number	transition metal	Group 2	Group 4	Group 5	Group 2	Group 7

2a	B+F Both for 1 mark	

Experiment	Temperature	Particle Size	Concentration
B	20°C	Lump	1 mol/l
F	20°C	Lump	2 mol/l

2b	D	

Variable	Temperature	Particle Size	Concentration
Fastest Reaction	Highest Temperature	Smallest Particle Size	Highest Concentration
Quantity	40°C	Powder	2 mol/l

3a	C+F Both for 1 mark	

Answer	A	B	C	D	E	F
Substance	potassium	water	helium	air	sodium chloride	phosphorus
Type of Substance	metal element	covalent compound	non-metal element	mixture	ionic compound	non-metal element

3b	D	Air is a mixture of gases (approx 80% nitrogen and approx 20% oxygen)
4a	F	Iron is made in a blast furnace: $Fe_2O_3 + 3CO \longrightarrow 2Fe + 3CO_2$
4b	A	Unreactive metals do not react with dilute acid e.g. copper, mercury, silver & gold
4c	B	Very reactive metals e.g. potassium, sodium, lithium must be stored under oil to keep air and water away from the metal to prevent reaction
5	C	☒ A melting of solids to liquids is a physical change (no new substances formed) ☒ B distillation is not a chemical reaction as the chemicals boil and then condense ☑ C burning (combustion) is a chemical reaction where new substances are formed ☒ D evaporation of liquids to gases is a physical change (no new substances formed)
6a	A+E Both for 1 mark	

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

6b	E	

Answer	A	B	C	D	E	F
Chemical	zinc chloride	magnesium sulphate	sodium chlorate	lead carbonate	hydrogen sulphide	potassium nitrite
Bonding Type	Ionic (metal+non-metal)	Ionic (metal+non-metal)	Ionic (metal+non-metal)	Ionic (metal+non-metal)	Covalent (non-metals only)	Ionic (metal+non-metal)

7a	F	

Answer	A	B	C	D	E	F
Substance	chlorine	nitrogen	ammonia	oxygen	hydrogen	ethene
Formula	Cl_2	N_2	NH_3	O_2	H_2	C_2H_4

7b	C	Ammonia forms an alkali when dissolved in water. Damp pH paper will turn blue with ammonia
7c	E	acid + metal ⟶ salt + hydrogen hydrochloric acid + zinc ⟶ zinc chloride + hydrogen
8a	C	Ferroxyl indicator turns blue in the presence of Fe^{2+} ions Ferroxyl indicator turns pink in the presence of OH^- ions
8b	B	Fertilisers contain one of the following elements: N, P or K
9	A,D 1 mark each	☑ A Both air/oxygen and water are required for corrosion to occur. ☒ B Attaching iron to the positive terminal speeds up rusting. ☒ C Salt speeds up rusting by being the electrolyte to complete the circuit ☑ D Rusting is the corrosion of iron and steel (but not other metals) ☒ E Coating iron in zinc is called galvanising

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Question	Answer	Chemistry Covered
10a	Nucleus	The nucleus at the centre of an atom is positively charged and contains protons and neutrons
10b	Halogens	Name: Alkali Metals | Halogens | Noble gases | Transition Metals Location: Group 1 | Group 7 | Group 0 | Between Group 2 + 3
11a	Haber Process	Nitrogen + Hydrogen $\rightleftharpoons^{\text{Fe catalyst}}$ Ammonia $N_2 + 3H_2 \rightleftharpoons^{\text{Fe catalyst}} 2NH_3$
11b	very unreactive	Only the most unreactive elements are found uncombined in the Earth's crust e.g. silver, gold and platinum
11c	alloy	Alloys are mixtures of metals e.g. brass, bronze, amalgam, cupro-nickel, steel, stainless steel
12a	asphalts 5% aromatics 15% paraffins 30%	Problem Solving: Transfer of information from table to pie chart
12b	alkane	Alkanes, Alkenes and Cycloalkanes are all families of hydrocarbons
12c	$C_{20}H_{42}$	General Formula of Alkanes = C_nH_{2n+2} If n=20, 2n+2= (2x20)+2 = 40+2 = 42 $\therefore$ Formula of eicosane = $C_{20}H_{42}$
13a(i)	A	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 increasing acidity ← neutral → increasing alkalinity
13a(ii)	1-4mA	pH=6 ethanoic acid contains less ions than pH=5 ethanoic acid $\therefore$ pH=6 Ethanoic acid will have a smaller current than pH=5 ethanoic acid
13b	Hydrogen or H^+	All acids contain Hydrogen H^+ ions. All alkalis contain the hydroxide OH^- ion. Neutral solutions contain equal concentrations of H^+ ions and OH^- ions.
14a	Styrene	Monomer: ethene | propene | styrene | chloroethene Polymer: poly(ethene) | poly(propene) | poly(styrene) | poly(chloroethene)
14b	addition polymerisation	Addition: C=C double bonds open up join together to form long chain of C-C Polymerisation: monomers join together to form polymer
14c	renewable or biodegradable	Starch is a renewable source of energy as it grows every year and is easily replaced. The material made from the starch is likely to be biodegradable as it contains the sort of chemical groups that bacteria can break down.
15a(i)	Chlorophyll	carbon dioxide + water $\xrightarrow[\text{light}]{\text{chlorophyll}}$ glucose + oxygen $6CO_2 + 6H_2O \longrightarrow C_6H_{12}O_6 + 6O_2$
15a(ii)	Benedict's/Fehling's solution turns brick red/orange	Carbohydrate | Glucose | Fructose | Maltose | Sucrose | Starch Formula | $C_6H_{12}O_6$ | $C_6H_{12}O_6$ | $C_{12}H_{22}O_{11}$ | $C_{12}H_{22}O_{11}$ | $(C_6H_{10}O_5)_n$ Reaction with starch | No change | No change | No change | No change | Turns blue/black Reaction with Benedict's Solution | Turns brick red | Turns brick red | Turns brick red | No change | No change
15b	one from:	Mass of carbohydrate being burned | Volume of water | Distance between test tube and burning carbohydrate Position of thermometer | Particle Size | Same Test tube/size of test tube
15c	not sweet | does not dissolve	Substance | Taste | Solubility | Effect on Beam of light Sugar | sweet | soluble | no scattering Starch | not sweet | insoluble | scattering
15d	oxygen	Type | Elements on substance of type Carbohydrate | Carbon | Hydrogen | Oxygen Hydrocarbon | Carbon | Hydrogen | -
16a	Electrons	Electrons flow through wires, ions move through solutions.

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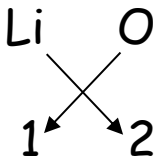
<table>
<tr><td>16b</td><td>Any metal lower than zinc in ECS</td><td>
<table>
<tr><td>Any one from:</td><td>iron</td><td>nickel</td><td>tin</td><td>lead</td></tr>
<tr><td>copper</td><td>mercury</td><td>silver</td><td>gold</td><td>platinum</td></tr>
</table>
</td></tr>
<tr><td>16c(i)</td><td>Any answer from:</td><td>
<table>
<tr><td>More portable</td><td>More power/current/voltage</td><td>Lasts longer/doesn't have to be replaced as often</td><td>Can power large devices/items</td></tr>
<tr><td>Can produce smaller batteries</td><td>Do not need to recharge battery as often</td><td>less waste as don't need to throw out as many batteries</td><td>Do not use as many batteries</td></tr>
</table>
</td></tr>
<tr><td>16c(ii)</td><td>Li_2O</td><td>
<table>
<tr><td>Write down Valency below each element's symbol
Li O
1 2</td><td>Put in Cross-over Arrows
  </td><td>Follow arrows to get formula
Li_2O</td></tr>
</table>
</td></tr>
<tr><td>16d</td><td>bar chart containing:</td><td>½mark vertical scale ½mark correct labelling of bars 1mark bars drawn correctly</td></tr>
<tr><td>17a</td><td>Nitrogen & Oxygen</td><td>Nitrogen + Oxygen $\xrightarrow{\text{spark}}$ Nitrogen dioxide
$N_2 + 2O_2 \xrightarrow{\text{spark}} 2NO_2$</td></tr>
<tr><td>17b</td><td>Lightning</td><td>Lightning is a natural form of sparks with enough energy to react nitrogen and oxygen to become nitrogen dioxide. (N≡N bond needs lots of energy to break)</td></tr>
<tr><td>17c</td><td>Any pH 0→6</td><td>
<table>
<tr><td>Oxide Type</td><td>pH in water</td><td>Examples</td></tr>
<tr><td>Metal oxide</td><td>Metal oxides dissolve in water to form alkalis</td><td>K_2O, Na_2O</td></tr>
<tr><td>Non-metal oxide</td><td>Non-metal oxides dissolve in water for form acids</td><td>CO_2, NO_2, SO_2</td></tr>
</table>
</td></tr>
<tr><td>18a</td><td>Lattice</td><td>Ions are held together in an ionic lattice by electrostatic attraction between positive and negative ions.</td></tr>
<tr><td>18b</td><td>Ions are unable to move in solid lattice</td><td>In solid ionic substances, the ions are held tightly together and are unable to move ∴ solid ionic substances do not conduct. When ionic substances are melted or dissolved, the lattice structure breaks up and the ions are now free to move. Liquid and solution ionic compounds can conduct electricity (compound is broken down as it conducts)</td></tr>
<tr><td>18c</td><td>Colourless</td><td>
<table>
<tr><td>Ion</td><td>Sodium</td><td>Chloride</td><td>Nickel</td><td>Dichromate</td></tr>
<tr><td>Colour</td><td>colourless</td><td>colourless</td><td>green</td><td>orange</td></tr>
<tr><td>Reasoning</td><td colspan="2">Both ions in sodium chloride must be colourless of the compound is colourless</td><td>Green colour must comes from Nickel ion of chloride ion is colourless</td><td>Orange colour comes from Dichromate ion if sodium ion is colourless.</td></tr>
</table>
</td></tr>
<tr><td>18d</td><td>carbon or carbon monoxide</td><td>Reduction with C: $2Fe_2O_3 + 3C \longrightarrow 4Fe + 3CO_2$
Reduction with CO: $Fe_2O_3 + 3CO \longrightarrow 2Fe + 3CO_2$</td></tr>
<tr><td>19a</td><td>sodium carbonate</td><td>sodium carbonate has the lowest solubility from the table</td></tr>
<tr><td>19b(i)</td><td>20°C</td><td>Problem Solving: interpreting information in a line graph</td></tr>
<tr><td>19b(ii)</td><td>Increase in temperature increases the solubility</td><td>Problem Solving: Formulation of a conclusion from a line graph.</td></tr>
<tr><td>20a(i)</td><td>Cracking</td><td>Cracking turns less useful, longer chain saturated hydrocarbons in to more useful, shorter chained hydrocarbons. Some of the products are unsaturated and can be used to make addition polymers.</td></tr>
<tr><td>20a(ii)</td><td>water</td><td>potassium hydroxide + hydrochloric acid → potassium chloride + water
metal hydroxide (alkali) + acid → salt + water</td></tr>
<tr><td>20b</td><td>contains C=C double bond or unsaturated</td><td>Bromine solution is quickly decolourised by unsaturated compounds containing C=C double bonds.</td></tr>
<tr><td>20c</td><td>lead iodide</td><td>lead nitrate (soluble) + sodium iodide (soluble) → sodium nitrate (soluble) + lead iodide (insoluble)</td></tr>
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