Past Papers Int 1 Chemistry

2015 Marking Scheme

Grade Awarded	Mark Required (/60)	Mark Required %	% candidates achieving grade
A	42+	70%	55.6% (NB 5 candidates)
B	36+	60%	33.3% (NB 3 candidates)
C	30+	50%	11.1% (NB 1 candidates)
D	27+	45%	0%
No award	<27	<45%	0%

Section:	Multiple Choice	Extended Answer
Average Mark:	15.0 /20	26.0 /40

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MC Qu	Answer	% Pupils Correct	Reasoning
1	B	33	☒A oxygen makes up approximately 20% of air ☑B nitrogen makes up approximately 80% of air ☒C chlorine is only found in air in very small amounts (practically zero) ☒D carbon dioxide makes up approximately 0.03% of air
2	A	100	☑A curium was discovered in 1944, 10 years after the death of Marie Curie ☒B titanium was discovered in 1791, 43 years before the death of Marie Curie ☒C strontium was discovered in 1790, 44 years before the death of Marie Curie ☒D magnesium was discovered in 1808, 126 years before the death of Marie Curie
3	C	100	☒A Aluminium melts at 600°C and would be a liquid at 1000°C ☒B Calcium melts at 842°C and would be a liquid at 1000°C ☑C Iron melts at 1538°C and would be a solid at 1000°C ☒D Magnesium melts at 650°C and would be a liquid at 1000°C
4	C	89	Sodium fluoride is added to drinking water to prevent tooth decay.
5	B	100	☒A catalysts increase the speed of a reaction ☑B catalyst speed up reactions but the mass of catalyst is unchanged at end ☒C catalysts increase the speed of a reaction ☒D catalysts are not used up during a reaction and the mass is unchanged at end
6	C	100	☒A mass of magnesium ribbon (1g) was kept constant in all three experiments ☒B volume of acid (50cm^3) was kept constant in all three experiments ☑C concentration of acid is being investigated as it changed in the experiments ☒D temperature (20°C) was kept constant in all three experiments
7	D	89	<table><tr><td>Type of Bond</td><td>Bonds between atoms in molecules</td><td>Bonds between molecules</td></tr><tr><td>Strength of Bond</td><td>Strong</td><td>weak</td></tr></table>
8	A	67	☑A baking soda is a household alkali with a pH above 7 ☒B coke is a household acid with a pH below 7 ☒C lemonade is a household acid with a pH below 7 ☒D vinegar is a household acid with a pH below 7
9	D	67	☒A aluminium is made by electrolysis of molten aluminium ore ☒B silver is a very unreactive metal and is found uncombined in the Earth's crust ☒C gold is a very unreactive metal and is found uncombined in the Earth's crust ☑D iron is made by heating iron ore with carbon in a blast furnace
10	D	67	☒A no voltage is produced as solution used contains no ions to complete the circuit ☒B no voltage is produced as the same metal is used in both electrodes ☒C no voltage is produced as the same metal is used in both electrodes ☑D voltage produced between two metals connected in a solution containing ions
11	C	78	☒A nylon is a synthetic/man-made fibre made by the chemical industry ☒B polythene is a synthetic material made by the chemical industry ☑C silk is a natural material made by silk worms ☒D terylene is a synthetic/man-made fibre made by the chemical industry
12	B	33	☒A cracking splits larger fractions into smaller, more useful smaller chemicals ☑B distillation splits crude into fractions using the different boiling points ☒C fermentation splits glucose in ethanol and CO_2 in anaerobic conditions ☒D filtration separates insoluble solids from liquids
13	D	89	The larger the molecule the higher the boiling point. The smaller the molecule the lower the boiling point.

14	A	78	☑A a lightweight plastic bottle which is insoluble in water is ideal for lemonade ☒B plastic which dissolves in water would be useless as a container for lemonade ☒C A heavy bottle would cost more to transport and less useful to customers ☒D A heavy bottle would cost more to transport and less useful to customers
15	A	78	Respiration is the process where glucose is broken down to release energy glucose + oxygen ⟶ carbon dioxide + water
16	C	89	☒A carbon dioxide has be identified as a gas which causes the Greenhouse Effect ☒B burning petrol releases carbon dioxide into the atmosphere ☑C cutting down trees prevents trees from turning carbon dioxide into oxygen ☒D increased carbon dioxide levels cause the atmosphere to warm up not cool down
17	B	78	$\%\ \text{nitrogen} = \frac{\text{mass of nitrogen}}{\text{total mass}} \times 100 = \frac{40}{200} \times 100 = 20\%$
18	C	56	☒A fats and oils provide the body with energy ☒B proteins provide the body with materials for growth and repair ☑C calcium is a mineral needed for bones and iron is a mineral needed by the blood ☒D carbohydrates (starch and sugars) provide the body with energy
19	B	67	☒A 1 pint of beer contains 2 units of alcohol ☑B 2 pints of beer contains 4 units of alcohol ☒C 1 measure of spirits contains 1 unit of alcohol ☒D 2 measures of spirits contain 2 units of alcohol
20	A	44	☑A alcohol is made by the fermentation of carbohydrates ☒B distillation increases the alcohol content of drinks to make spirits ☒C carbohydrates are the raw material from which alcoholic drinks are made ☒D carbohydrates are the raw material from which alcoholic drinks are made

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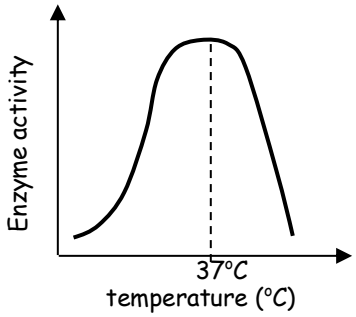
Long Qu	Answer	Reasoning
1a	increases	Problem Solving: draw a conclusion from a line graph.
1b(i)	(transition) metal	Nickel is a metal as it is located on the left of the steps on the periodic table. Nickel is a transitional metal is it is located in the block between groups 2 and 3.
1b(ii)	Ni	Each element on the periodic table has an atomic number and a symbol. (First letter of symbol is always a capital letter. If there is a second letter in symbol then it must be a lower case letter)
2a	Less than 7	<table><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td></tr><tr><td colspan="7">Acid pH</td><td>Neutral</td><td colspan="7">Alkali pH</td></tr></table>
2b	Nu-skin	Problem Solving: Highest concentration of alpha hydroxyl acids = 70 Use of alpha hydroxyl acids with concentration of 70 = treating acne scars Name of product for treating acne scars = Nu-skin
2c	Corrosive	<table><tr><td>Hazard</td><td>Harmful/Irritant</td><td>Poisonous</td><td>Corrosive</td><td>Flammable</td></tr><tr><td>Symbol</td><td>  </td><td>  </td><td>  </td><td>  </td></tr></table>
3a	C→D→A→B	<table><tr><td>C</td><td>Copper carbonate powder must be reacted with the acid first to form copper sulphate</td></tr><tr><td>D</td><td>The extra copper carbonate powder must be removed by filtration before attempting to collect the copper sulphate product</td></tr><tr><td>A</td><td>Boiling the solution will remove the water to leave copper sulphate crystals</td></tr><tr><td>B</td><td>Copper sulphate crystals will remain in the evaporating basin.</td></tr></table>
3b	Sulphuric acid	<table><tr><td>Acid Used</td><td>Name ending of Salt Produced</td></tr><tr><td>Hydrochloric acid</td><td>Chloride</td></tr><tr><td>Sulphuric acid</td><td>Sulphate</td></tr><tr><td>Nitric Acid</td><td>Nitrate</td></tr></table>
4a	One answer from:	<table><tr><td>New substance made</td><td>Colour change</td><td>Potassium hydroxide made</td></tr><tr><td>Carbon dioxide made</td><td>Gas given off</td><td>Potassium permanganate turns brown</td></tr></table>
4b(i)	Fuel circled	When vegetation is deliberately burned back then there will be no fuel to catch fire at the wrong time.
4b(ii)	Combustion	Burning and combustion both describe the reaction where a substance reacts with oxygen.
5a	Answer from:	<table><tr><td>Stops oxygen/air</td><td>Stops water</td><td>Stops oxygen and water</td><td>Stops air and water</td></tr></table>
5b	Oxygen	<table><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>
5c	11	Total of other substances = 72+13+4 = 89% ∴ percentage aluminium oxide = 100 – 89 = 11%
6a	<table><tr><td>Magnesium</td><td></td><td></td></tr><tr><td></td><td>no</td><td>none/no</td></tr><tr><td>zinc</td><td></td><td></td></tr></table>	Magnesium is the most reactive, zinc next and copper the least reactive. Zinc reacts with copper to make hydrogen gas but copper does not react with dilute acids so copper will not produce any gas at all.
6b	Hydrogen	metal + acid ⟶ salt + hydrogen e.g. magnesium + hydrochloric acid ⟶ magnesium chloride + hydrogen
7	1. finite 2. Carbon dioxide or carbon monoxide	Coal is a finite resource as it will run out one day with over-use. Coal is black due to the high percentage of carbon inside which burns to form carbon dioxide (or carbon monoxide is oxygen supply is limited).
8a	Polystyrene	<table><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>
8b	Bar graph showing:	<table><tr><td>½ mark: % label</td><td>½ mark: Scale on % axis</td><td>½ mark: Bars labelled</td><td>½ mark: Correct height of bars</td></tr></table>

<table>
<tr><td>9a</td><td>Dissolves in both oil and water</td><td> 
HEAD
soluble in water
TAIL
Soluble in oil/grease</td></tr>
<tr><td>9b</td><td>scum</td><td>Scum is the precipitate formed when calcium ions in hard water react with detergents. It can be hard to remove from bath surfaces but isn't so much a problem in Scotland where water is softer water.</td></tr>
<tr><td>9c</td><td>Enzyme is denatured/destroyed</td><td>Enzymes work best at temperatures around body temperature and when the temperature is raised the enzymes change shape permanently and do not work any more.
 
</td></tr>
<tr><td>9d</td><td>Amino acids</td><td>Proteins are natural polymers made from amino acid building blocks. Hydrolysis of proteins during the digestion of food will release the original amino acids.</td></tr>
<tr><td>10a</td><td>Thermometer</td><td>Thermometers are the device which measure temperature.</td></tr>
<tr><td>10b</td><td>Type V</td><td>The chocolate melts as 34°C and the nearest type of cocoa butter crystals which melts at a temperature close to 34°C is Type V (at 33.8°C)</td></tr>
<tr><td>11a</td><td><table><tr><td>nitrogen</td><td></td><td></td></tr><tr><td></td><td></td><td>phosphate</td></tr><tr><td>leaf growth</td><td>fruit growth</td><td></td></tr></table></td><td>Problem Solving: transfer of information from written passage to flow chart</td></tr>
<tr><td>11b</td><td>pesticides</td><td><table><tr><th>Chemical</th><th>How It Protect Plants</th></tr><tr><td>Pesticide</td><td>Protects plants from insects by killing insects</td></tr><tr><td>Herbicides</td><td>Kills weeds which reduce the nutrients in the soil</td></tr><tr><td>Fungicides</td><td>Protects plants from diseases which kill plants</td></tr></table></td></tr>
<tr><td>12a(i)</td><td>energy</td><td><table><tr><th>Food Type</th><th>Used by the Body for</th></tr><tr><td>Protein</td><td>growth and repair of body tissues</td></tr><tr><td>Carbohydrate</td><td>energy</td></tr><tr><td>Fat</td><td>energy</td></tr><tr><td>Fibre</td><td>keeps gut working properly and prevents constipation</td></tr></table></td></tr>
<tr><td>12a(ii)</td><td>iodine and black</td><td><table><tr><td>Test for</td><td>Fat/Oil</td><td>Sugars (except sucrose)</td><td>Starch</td></tr><tr><td>Result</td><td>Oily mark on Filter Paper</td><td>Benedict's solution turns orange</td><td>iodine solution turns blue/black</td></tr></table></td></tr>
<tr><td>12b</td><td>one from:</td><td><table><tr><td>Preservatives</td><td>Appearance</td><td>Nutritional content</td><td>Flavour of food</td></tr></table></td></tr>
<tr><td>13a</td><td>heart attack/disease</td><td>High levels of cholesterol can lead to the clogging of the arteries of the heart and when they block this will lead to a heart attack.</td></tr>
<tr><td>13b(i)</td><td>Greater than 66 million tonnes</td><td>Trend from bar chart is of increasing production of rapeseed oil as time goes on. 2015 would be higher than the production value from 2013 (66 million tonnes)</td></tr>
<tr><td>13b(ii)</td><td>Saturated fat
Omega 3 oil
Omega 9 oil
Omega 6 oil</td><td>Problem Solving: transfer of information from table to pie chart</td></tr>
<tr><td>14a</td><td>alters the way the body works</td><td>Drugs, medicines or illegal, alter the way the body works in a variety of ways. Some alterations are beneficial to the body.</td></tr>
<tr><td>14b</td><td>$C_9H_8O_4$</td><td>The formula of a chemical tells us the relative amounts of each element.</td></tr>
<tr><td>14c</td><td>One from:</td><td><table><tr><td>Cocaine</td><td>Heroin</td><td>Coke</td><td>Amphetamines</td><td>LSD</td><td>Other illegal substances acceptable</td></tr></table></td></tr>
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