JABchem

Past Papers Int 1 Chemistry

2001 Marking Scheme

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MC Qu	Answer	Reasoning
1	D	☒A bromine is a non-metal ☒B mercury is a metal ☒C mercury and bromine are both liquids at room temperature ☑D mercury and bromine are both liquids at room temperature
2	C	☒A carbon reacts with copper oxide to form copper and carbon dioxide ☒B copper is a product in this reaction not a reactant ☑C hydrogen reacts with copper oxide to form copper metal and hydrogen oxide (water) ☒D oxygen does not react with copper oxide
3	C	Bonds *inside* molecules are strong bonds Bonds *between* molecules are weak bonds
4	A	☑A soap is a household alkali (pH above 7) ☒B Lemonade is a fizzy drink and is a household acid (pH below 7) ☒C Soda water is a fizzy drink and is a household acid (pH below 7) ☒D Vinegar is a household acid (pH below 7)
5	D	☒A Particle size must be the same in a fair test (1 is a lump and 2 is powder) ☒B Temperature must be the same in a fair test (2 is 50°C and 3 is 25°C) ☒C Concentration must be different to compare the effect of changing concentration ☑D Different concentration but same temperature and particle size
6	A	• sulphur + oxygen → sulphur dioxide • sulphur dioxide dissolves in water to form an acid (acid rain in atmosphere) • acids have a pH below 7
7	D	☒A lead metal does not burn easily in air ☒B Lead metal reacts with acid because it is more reactive than copper ☒C lead is a good conductor of electricity because it is a metal ☑D malleability: the ability to beat a metal into a particular shape
8	B	☒A iron is more reactive than tin ∴ iron will rust to protect the tin ☑B iron is *less* reactive than zinc ∴ zinc will corrode to protect the iron ☒C iron is more reactive than tin ∴ iron will rust to protect the tin ☒D iron is more reactive than copper ∴ iron will rust to protect the copper
9	C	Metals placed in order of reactivity: Magnesium | Zinc | Iron | Lead | Copper Most reactive → Least Reactive The bigger the gap in reactivity, the greater the voltage
10	C	☒A Cotton is a natural fibre made from cotton plants ☒B Silk is a natural fibre collected from silk worms ☑C Terylene is a form of polyester and is a synthetic (man-made) fibre ☒D Wool is a natural fibre collected from sheep
11	B	Most plastics are made from ethene-based compounds. Ethene is made from cracking crude oil fractions
12	B	☒A Gasoline (naphtha) is used to make petrol ☑B Kerosene is used to make aircraft fuel ☒C Light gas oil is used to make diesel ☒D Heavy gas oil is used to make ship fuel and lubricating oil
13	A	Property: Petroleum Gas	Gasoline	Kerosene	Gas Oils	Residue Viscosity: Low → High Size: Smaller → Larger Flammability: High → Low Boiling Point: Low → High

14	A	☑A The major element in the human body are carbon, hydrogen, oxygen and nitrogen ☒B iron is a mineral required by the body but is not a major element in the body ☒C calcium is a mineral required by the body but is not a major element in the body ☒D iron and calcium are minerals required by the body but are not major elements in the body
15	D	☒A True: carbon dioxide is a gas which causes the Greenhouse Effect (Global Warming) ☒B True: fossil fuels are carbon-based compounds and they burn to form carbon dioxide ☒C True: trees turn carbon dioxide back into oxygen so clearing forests increases CO_2 levels ☑D False: Increasing carbon dioxide levels causes the atmosphere to warm up (Greenhouse effect)
16	D	☒A Respiration: glucose + oxygen ⟶ carbon dioxide + water ☒B Fermentation: glucose ⟶ ethanol + carbon dioxide ☑C Polymerisation: small monomer molecules join up to make larger polymer molecules ☒D Photosynthesis: carbon dioxide + water ⟶ glucose + oxygen
17	D	☒A Maltose is a reducing sugar which turns Benedict's solution blue ⟶ orange (brick red) ☒B Glucose is a reducing sugar which turns Benedict's solution blue ⟶ orange (brick red) ☒C Fructose is a reducing sugar which turns Benedict's solution blue ⟶ orange (brick red) ☑D Sucrose is not a reducing sugar and does not react with Benedict's solution
18	D	☒A Less vegetables were eaten in 1998 compared to 1988 ☒B Less vegetables were eaten in 1998 compared to 1988 ☒C More fruit was eaten in 1998 compared to 1988 ☑D Less vegetables and more fruit was eaten in 1998 compared to 1988
19	B	☒A Distillation: The separation of chemicals with different boiling points ☑B Fermentation: glucose ⟶ ethanol + carbon dioxide ☒C Polymerisation: small monomer molecules join up to make larger polymer molecules ☒D Respiration: glucose + oxygen ⟶ carbon dioxide + water
20	B	☒A No gas would pass through the limewater ∴ no carbon dioxide would be detected ☑B Carbon dioxide will be sucked through the limewater and the limewater will turn milky ☒C The limewater will be sucked through to the pump ☒D The limewater will be sucked through to the pump

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Long Qu	Answer	Reasoning
1a	1898	Neon was discovered in 1898 (p2 of data booklet)
1b	Na	Each element has a symbol. The 1st letter is a capital letter. If there is a 2nd letter it is lower case.
1c	Helium, Argon, Xenon, Krypton or Radon	Elements in the same group of the periodic table have similar chemical properties. Neon is a Noble gas (group 0). All Noble Gases are very unreactive
2a	Soap is soluble in both water and grease	Soap mixes into the grease, surrounds the grease and make the grease droplet soluble
2b	Scum	When soap reacts with calcium ions in hard water, an insoluble solid called scum is formed. (Soapless detergents do not form a scum with hard water)
2c(i)	To prevent tooth decay	Fluoride is added to drinking water to help prevent tooth decay Chlorine is added to drinking water to kill bacteria
2c(ii)	Sodium and Fluorine	-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) NB metal always comes first in name
3a	C_4H_{10} or $H_{10}C_4$	Formula must have correct symbols for each element and the numbers must be subscripts (small and below)
3b	Hydrocarbons	Hydrocarbons: compounds containing the elements carbon and hydrogen only
3c	butane + oxygen ↓ carbon dioxide + water	butane + oxygen → carbon dioxide + water (reactants) (products)
4a	Chemical | Health Problem	Problem Solving: Headings of a table
4b	Being unable to manage without drug	Addiction to a drug means that the addict cannot manage to function normally with the drug.
5a	Answer to include:	to show that heat energy is produced when starch and sugar are burned and to compare how much heat energy each produces.
5b(i)	The temperature rise will be greater the closer the spoon is to the test tube	The distance between the spoon and the test tube affects the amount of heat transferred to the test tube from the burning carbohydrate. The closer the spoon, the greater the transfer of heat The further away the spoon, the lower the transfer of heat
5b(ii)	Volume of water or Mass of carbohydrate	The higher the volume of water, the lower the final temperature will rise to. The higher the mass of carbohydrate burned the higher the temp achieved.
5c	Iodine turns blue/black	The test for starch is iodine turns blue/black

<table>
<tr><td>6a</td><td>NO_2</td><td>
<table>
<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>
<tr><td>Example</td><td>Carbon Monoxide
CO</td><td>Nitrogen Dioxide
NO_2</td><td>Sulphur Trioxide
SO_3</td><td>Dinitrogen Tetroxide
N_2O_4</td></tr>
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</td></tr>
<tr><td>6b</td><td>Spark in engine</td><td>The joining of nitrogen and oxygen to form nitrogen dioxide requires a high energy spark from a spark plug or lightning</td></tr>
<tr><td>6c</td><td>Damage to:
Carbonate building
Metal structures
Plant or marine life</td><td>Acid rain causes damage to plant life and marine life in rivers, lakes and lochs. Acid also reacts with carbonate rocks and metal structures.</td></tr>
<tr><td>6d</td><td>To speed up reaction</td><td>Catalysts which have a smaller particle size will catalyse the reaction faster</td></tr>
<tr><td>7a</td><td>Cuts off the oxygen</td><td>The blanket will seal the chip pan so no fresh air will enter the chip pan. The oxygen in the pan will quickly run out and the flame will go out.</td></tr>
<tr><td>7b</td><td>Fire would jump up as oil floats on water</td><td>The water would sink into the burning oil and the burning oil will jump up to make room for the water. A large flame will be given off and set fire to the room and/or room</td></tr>
<tr><td>7c</td><td>Incomplete combustion of plastic</td><td>Incomplete combustion of plastics will produce the poisonous gas carbon monoxide.
• Plastics containing chlorine e.g. PVC release poisonous hydrogen chloride
• Plastics containing cyanide groups e.g. polyurethane will release poisonous hydrogen cyanide</td></tr>
<tr><td>8a</td><td>Line graph showing:</td><td>½ mark – correct scale on y-axis
½ mark – correct label on y-axis
½ mark – correctly drawn points
½ mark – suitable line joining points</td></tr>
<tr><td>8b</td><td>4.5</td><td>
<table>
<tr><td>pH</td><td>7.0</td><td>7.5</td><td>8.0</td><td>8.5</td></tr>
<tr><td>Time (min)</td><td>1.5</td><td>2.5</td><td>3.5</td><td>-</td></tr>
<tr><td>Difference</td><td></td><td>1.0</td><td>1.0</td><td>1.0</td><td></td></tr>
<tr><td>Estimate</td><td>-</td><td>-</td><td>-</td><td>4.5</td></tr>
</table>
</td></tr>
<tr><td>8c</td><td>acidic</td><td>
<table>
<tr><td>Acidic</td><td>Neutral</td><td>Alkaline</td></tr>
<tr><td>pH less than 7</td><td>pH = 7</td><td>pH greater than 7</td></tr>
</table>
</td></tr>
<tr><td>8d</td><td>Speeds up a reaction</td><td>A catalyst speeds up a reaction but is not used up in the reaction
e.g. 1g of a catalyst at start ∴1g of catalyst at end</td></tr>
<tr><td>9a</td><td>Gold, silver or platinum</td><td>Only the least reactive metals will be found uncombined in the Earth's crust e.g. gold, silver or platinum</td></tr>
<tr><td>9b</td><td>iron ore
limestone
coke
iron
(hot) air
slag</td><td>Problem Solving: transfer of information from written passage to diagram</td></tr>
<tr><td>9c(i)</td><td>Electrolysis</td><td>Aluminium ore (aluminium oxide) is melted and electricity is passed through it. Aluminium metal forms on the negative electrode</td></tr>
<tr><td>9c(ii)</td><td>Low density</td><td>Problem Solving: Selecting correct answer from data booklet</td></tr>
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<tr><td>10a</td><td>10cm^3 of acid added to 10cm^3 water</td><td>2 mole per litre acid is twice the concentration of 1 mole per litre acid. A 50% dilution with water will turn 2 mole per litre acid into 1 mole per litre acid.
10cm^3 of 2 mole per litre acid added to 10cm^3 water is a 50% dilution which produced 20cm^3 of 1 mole per litre acid</td></tr>
<tr><td>10b</td><td>Time the reaction until bubbling stops</td><td>The reaction gives off hydrogen gas and the bubbling can be timed until the bubbling stops. The longer the time taken, the slower the reaction</td></tr>
<tr><td>10c</td><td>magnesium sulphate</td><td>ACID + METAL ⟶ SALT + HYDROGEN
sulphuric acid + magnesium ⟶ magnesium sulphate + hydrogen</td></tr>
<tr><td>11a</td><td>Fertiliser</td><td>Harvesting crops remove nutrients from the soil and this must be replaced by the use of fertilisers.</td></tr>
<tr><td>11b</td><td>Make nitrate compounds from nitrogen in air</td><td>Leguminous Plants contain nitrifying bacteria in root nodules which fix atmospheric nitrogen into nitrate compounds.
e.g. pea family, bean family and clover</td></tr>
<tr><td>11c</td><td>35%</td><td>$\%\ \text{nitrogen} = \frac{\text{Mass of nitrogen}}{\text{Mass of fertiliser}} \times 100 = \frac{7}{20} \times 100 = 35\%$</td></tr>
<tr><td>11d</td><td>Polymerisation</td><td><table><tr><th>Name</th><th>Description</th></tr><tr><td>Monomer</td><td>Small molecules which join together to make polymer</td></tr><tr><td>Polymer</td><td>Large molecule formed by the joining together of monomers</td></tr><tr><td>Polymerisation</td><td>The process where small monomers join together to form a polymer</td></tr></table></td></tr>
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