

SCIENCE

Paper 5126/01
Multiple Choice

<i>Question Number</i>	<i>Key</i>	<i>Question Number</i>	<i>Key</i>
1	D	21	B
2	D	22	D
3	D	23	A
4	B	24	A
5	B	25	B
6	D	26	C
7	C	27	A
8	C	28	B
9	A	29	C
10	B	30	D
11	A	31	D
12	A	32	A
13	B	33	D
14	B	34	B
15	C	35	C
16	C	36	C
17	B	37	D
18	A	38	D
19	D	39	B
20	C	40	B

Comments on individual questions (Chemistry)

Question 1

Only a small proportion of the candidates realised that the boiling point of X is between room temperature and the boiling water. A significant number of candidates thought that the boiling point of liquid X is 100°C and chose option A.

Question 2

The better candidates are aware of the relationship between the number of electron shells and the position of elements in the Periodic Table.

Question 3

The properties of sodium chloride, an ionic substance, are not well known by a large number of candidates. Over 50% of the candidates chose either B or C.

Question 4

Almost 40% of the candidates thought that an ammonia molecule contains four hydrogen atoms and chose option D, whilst a large proportion of the remaining candidates chose option A, where there is no lone pair of electrons.

Question 5

This question was very well done by the better candidates.

Question 6

There is a lack of understanding of calculations involving volumes of gases amongst the majority of candidates. Candidates should be aware of the relationship between a chemical equation and reacting masses and volumes.

Question 7

Elements of guesswork amongst the candidates indicated a lack of understanding of endothermic and exothermic reactions.

Question 8

The factors which influence the rate of a chemical reaction are well understood by the majority of the candidates.

Question 9

Only the better candidates were able to identify baking soda as an alkali that neutralises excess acid in the stomach.

Question 10

The gradation of properties within a group in the Periodic Table was not well known by the majority of candidates.

Question 11

The fact that argon is a monatomic gas with a full outer shell of electrons is well known by the majority of the candidates but fewer candidates are aware of its use in light bulbs.

Question 12

The majority of the candidates incorrectly identified metal X as sodium ignoring the fact that the metal is shown as being denser than water.

Question 13

Less than 25% of the candidates identified Y as coke.

Question 14

This question was well done by a good proportion of the candidates but a third of them thought that oxygen remained in the syringe at the end of the experiment and chose option C.

Question 15

The use of relative temperatures and pressures in this question made the question difficult for many candidates.

Question 16

The properties of a homologous series are well known by the better candidates.

Question 17

The better candidates correctly identified the formula of ethene as a compound that undergoes addition reactions but almost 40% of the candidates chose option C, the formula of methane.

Question 18

The reactions and properties of ethanol are not well known by many of the candidates.

Question 19

This was not well answered. Candidates should know that an ester is formed by the combination of an alcohol and a carboxylic acid.

Question 20

A large proportion of the candidates were able to identify the molecular formula of the monomer.

Comments on individual questions (Biology)

Question 21

Many candidates mistakenly believe that it is the cell wall that controls the entry of substances into the cell.

Question 22

This was not well answered, with many candidates guessing at the answer.

Question 23

This question showed good discrimination.

Question 24

Significant numbers of candidates were confusing respiration and photosynthesis.

Question 25–26

These questions were answered well by most candidates.

Question 27

This question discriminated well.

Question 28

Many candidates need to revise plant water relations.

Question 29

Candidates had difficulty in interpreting this question on blood flow in veins.

Question 30–31

These questions, on gas exchange, caused problems for some of the better candidates.

Question 32

Many candidates need to review nitrogenous excretion.

Question 33

Many candidates had the accommodation mechanism of the eye the wrong way round.

Question 34

Some of the better candidates believe that alcohol is a stimulant.

Question 35

This question discriminated well.

Question 36

This straightforward question on the carbon cycle caused problems for many candidates.

Question 37–38

These questions discriminated well.

Question 39

Most candidates did well on this question.

Question 40

Half of the candidates thought that blood groups show continuous variation.

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Paper 5126/03
Theory (Chemistry)

Section A

Question 1

Name, symbol and physical properties of specified metals and non-metals.

Well answered. Standard properties of metals and non-metals were accepted. Just specifying 'gas', for example 'oxygen', was not accepted unless 'at room temperature and pressure' was also included.

Question 2

Quite a difficult question involving descriptions of elements, compounds and mixtures.

A common error was in failing to realise that a substance with 'different atoms in a fixed ratio' must be a compound.

Question 3

Properties of acids and alkalis, with a test for an ammonium salt and a metallic carbonate.

The result of simple Universal Indicator tests for acids and alkalis was usually given correctly. In the case of the reaction with hydrochloric acid, all the following were accepted: ammonium chloride, carbon dioxide, carbonic acid and water.

For the reaction with sodium hydroxide, all of the following were accepted: ammonia, ammonium hydroxide, sodium carbonate and water.

As the question did not ask for a name, chemical formulae when correct were accepted for full marks.

Question 4

Paper chromatography, including an analysis of the results of one procedure.

- (a) Extremely well answered. Evidently candidates were well capable of analysing the quite complex chromatogram that was included.
- (b) Weaker candidates drew separate pieces of apparatus rather than 'the apparatus that could be used to produce this chromatogram'. Few candidates realised that the original ink spots should not be dipped directly into the solvent.
- (c) Knowing that 'if the dyes on bank notes are soluble in water then the dyes will run as soon as they are handled or become wet' was the intended basis of the answer to this question. That 'bank note inks are water insoluble' or 'bank notes are waterproof' was sufficient to earn this mark.

Question 5

Electronic structures and determinations from the number of protons and neutrons within a nucleus.

This was considered to be quite a demanding question and yet a very high proportion of candidates answered it well.

- (a) Non-metals will accept electrons into their electronic structure for stability. Many candidates believed that 'partially filled electron shells' resulted in non-metallic character.
- (b) Most candidates could determine atomic mass and atomic number when given the number of protons and neutrons in a nucleus. The difference in nuclear structures between isotopes of the same element was well understood.

Question 6

Simple organic reactions.

- (a) 'Poly(ethene)', 'polythene' and 'polyethylene' were all acceptable names for the product that results when polymerising ethene. 'Oxidation' of ethanol results in ethanoic acid. 'Ethyl ethanoate' is the result of reacting ethanoic acid with ethanol.

Well answered.

- (b) A common misunderstanding amongst candidates was to believe that the low boiling point of a small covalently bonded compound such as ethene is either the result of the weak bonding between the atoms or the weak bonding that results from a double bond. Few candidates described the presence of 'weak intermolecular forces', the correct reason for low boiling point.

Question 7

Rates of reaction.

- (a) The cotton wool in the mouth of the flask is both to prevent acid spray leaving the flask and dust entering.
- (b) Many candidates wrongly believed that the flask and its contents lost mass because the calcium carbonate (having been mixed with an acid) was 'being used up'. It was not considered enough to just write 'carbon dioxide is produced': for the mark to be awarded, the candidate had to indicate that she/he realised that the gas produced was 'given off' or 'lost' or 'was no longer included in the total mass being measured'.

Many candidates correctly determined from the graph supplied, that the reaction rate was decreasing but far fewer realised that after about thirteen minutes the reaction had stopped.

The calculation from the graph of mass lost and average rate of reaction over the first eight minutes was usually completed correctly. An impressive result.

Question 8

This question was/is considered to be very demanding as it certainly puts candidates in the position of not having to rely solely on their memory for an answer.

- (a) Candidates had to realise that an element (given a fictitious symbol Aa) that combines with chlorine to form a compound with the formula $AaCl$ must be a metal with a valency of one and so be placed in Group 1 of the Periodic Table of Elements. This is quite a task and yet many, many candidates were successful in its completion.

The level of reactivity of the metals in Group 1 increases on proceeding down the table and so the first member of this group must have the symbol Aa. Not an easy concept to grasp but many did.

- (b) Hence, Bb must be sodium, which reacts vigorously with water to liberate hydrogen. Using the special symbol Bb in writing the reaction of this element with water caused problems. At this level, writing B_2O as a product was considered sufficient to earn some of the marks available.

Section B

Question 9

Preparation and properties of lime.

- (a) Producing lime by heating calcium carbonate was rarely described. Many candidates believed that the industrial process to make lime involves adding calcium metal to water. A diagram was not required. However, many candidates knew the uses of lime with many describing its use by farmers in their fields to reduce acidity.
- (b) The properties of lime and the compounds that can be prepared from it were well known. Most candidates correctly identified the test for a chloride using acidified silver nitrate solution and the test for carbon dioxide using limewater.

Question 10

Sulfur dioxide and carbon monoxide as pollutant gases, with a calculation.

- (a) The response 'burning fossil fuels results in the production of sulfur dioxide and carbon monoxide' earned zero marks as it was a rewrite of the question. Sulfur, carbon and, in the case of carbon monoxide, a limited amount of air/oxygen, needed to be included in an answer for full marks to be earned.
- (b) Most candidates found this section very challenging. Few candidates included the necessary but simple chemical equation.

Even though a candidate failed to earn the mark available for '2g' of sulfur, she/he could still gain the full marks available for knowing how to convert this incorrect mass of sulfur into a mass and volume of sulfur dioxide, providing the correct technique was used.

Question 11

Homologous series and the properties of alkanes.

- (a) Several candidates gained two marks by giving a long list of the chemical reactions and of the trends in physical properties associated with the homologous series that they had named. Examples of the general characteristics accepted, each earning a single mark to a maximum of three marks, included: 'represented by a general formula', 'having similar chemical properties', 'having the same functional groups', 'showing a trend in certain physical properties', 'differing from the next in the series by CH_2 ', and 'having a common method of preparation'.
- (b) Few candidates failed to give the correct structural formula for ethane. The necessary relative molecular mass and so the percentage of hydrogen in the hydrocarbon was often calculated correctly.

The substances resulting from burning ethane in excess air were well known though carbon monoxide often appeared, incorrectly, in the chemical equation that candidates were asked to write. A common error, when attempting to write a complete chemical equation for this reaction, was to describe ethane as a solid. The difficult balancing of this equation was well done.

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Paper 5126/04
Theory (Biology)

There were too few candidates for us to be able to produce a meaningful report for this examination.