CONTENTS

FOREWORD

This booklet contains reports written by Examiners on the work of candidates in certain papers. **Its contents are primarily for the information of the subject teachers concerned**.

SCIENCE (PHYSICS, CHEMISTRY)

GCE Ordinary Level

Paper 5124/01
Multiple Choice

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

General comments

Candidate's scores ranged from 8 to 36 with a mean of 18.86 and a standard deviation of 6.63. No question proved particularly easy and evidence suggested that guessing the 'correct' response was widespread, even among the more able candidates. The most difficult questions appeared to be **4**, **14** and **15** with **Questions 2** and **8** also proving troublesome.

Comments on specific questions

Question 1

Excellent discrimination with those less able candidates who chose wrongly, favouring option **A** over option **C**.

Question 2

Most candidates appreciated that the area under the curve was related to the distance travelled but were then unsure as to which was the correct area! A positive distractor in option **A** suggests guessing amongst more able candidates who also supported options **B** and **D** in significant numbers. Less able candidates favoured option **D** but were quite evenly spread over all four options.

Questions 3 and 5

Both showed excellent discrimination with less able candidates favouring option **C** in **Question 3** and evenly split between options **C** and **D** in **Question 5**.

Question 4

This question showed uncertainty among candidates, with more than twice as many choosing option **B** as the correct option, **C**.

Question 6

Good discrimination and awareness from candidates in relating ice point to water – no candidate chose option **A**. Less able candidates were equally divided between options **B** and **C**.

Question 7

For the majority of candidates the choice was between options **B** and **C**, possibly knowing that in liquids, at least, thermal energy transfer is through local density changes. The final choice was down to guessing with more candidates, including the more able, incorrectly choosing option **B**.

Question 8

The definition of wave speed was not well known with the result that guessing was used to find an answer. Option **C** attracted more able candidates and option **D** more of the less able candidates.

Questions 9 and 13

In both questions more candidates chose a particular distractor than chose the key, indicative of uncertainty and guessing amongst even the better candidates. In **Question 9** it was option **C** and in **Question 13** option **D**.

Question 10

Most candidates knew the value for the speed of an electromagnetic wave in vacuo and the question discriminated well, the more able candidates correctly choosing option **D** and the less able option **B**.

Question 11

Excellent discrimination; a suggestion that a small number of more able candidates chose option **C**.

Question 12

Well known by the majority of candidates.

Questions 14 and 15

Showed uncertainty and guessing among the more able candidates who figured prominently over all the options in both questions. Weaker candidates opted, in **Question 14**, primarily for either option **A** or **C** in equal numbers but, in **Question 15**, were almost unanimous in their choice of option **A** and completely rejected option **C**, the correct one!

Question 16

The correct component was known by the majority of the more able candidates but not by the less able who chose either option **B** or **D** in almost equal numbers.

Question 17

Not well known with only 50% of candidates correctly choosing option **D**. Most of the remaining less able candidates opted for **A** while the majority of the remaining more able ones opted for **C**.

Questions 18 and 19

Well known by the majority of candidates.

Question 20

This question also discriminated well with the majority of the better candidates, and a small number of less able ones, correctly choosing option **A**. The majority of the less able candidates were spread over the remaining incorrect options, in roughly equal numbers.

Question 21

Over 70% of the candidates correctly selected the required apparatus in order to obtain pure water from seawater. A number of the weaker candidates selected option **A**, which included the filter funnel.

Question 22

This proved to be an easy question.

Question 23

An easy question for the better candidates.

Question 24

There was evidence of guesswork amongst the candidates. The better candidates were aware from the equation that 1 mole of calcium carbonate produces 24dm^3 of carbon dioxide and therefore 24cm^3 of carbon dioxide is produced from 0.001 moles of calcium carbonate.

Question 25

This was an easy question for the better candidates. A number of candidates did not take into account the relative atomic masses of sulphur and oxygen and chose option **A**.

Question 26

The majority of the candidates correctly stated that the gas produced during photosynthesis is oxygen.

Question 27

Only 45% of the candidates recognised that in order to produce a neutral solution an acid and an alkali should be mixed together.

Question 28

There was evidence of guesswork amongst the candidates. The solubility of salts is not well known by the candidates.

Question 29

Almost a third of the candidates chose option **D** because they did not recognise that barium sulphate was insoluble in water and therefore can be collected by filtration.

Question 30

Almost 70% of the candidates knew that the Group 1 metals were soft but just over half of these candidates knew that the Group 1 metals have a low density. The weaker candidates simply stated the general properties of metals rather than those specific to Group 1 and chose option **D**.

Question 31

There was evidence of widespread guesswork amongst all the candidates. Candidates were unable to relate the general properties of Group VII elements to the properties of astatine.

Question 32

This question was very well done particularly by the better candidates.

Question 33

Here 45% of the candidates recognised that haematite is reduced by carbon monoxide in the blast furnace. A significant proportion of the candidates chose option **B**, not recognising that limestone is used to remove acidic impurities not basic impurities.

Question 34

An easy question for the majority of the candidates.

Question 35

This question was answered poorly even by the better candidates. Over 60% of the candidates chose options **C** and **D** where the final volume of gas was either zero or 10cm^3. Only the best candidates understood that when iron rusts it reacts with the oxygen in the air and that the air only contains 20% of oxygen.

Question 36

Over 40% of candidates thought that the main constituent of natural gas was hydrogen rather than methane.

Question 37

The better candidates recognised the process as cracking but a large number of the candidates thought that the conversion of paraffin oil into an alkene involved combustion.

Question 38

This question was well done by the majority of the candidates.

Question 39

The better candidates recognised that the polyamide was produced from the combination of a dicarboxylic acid and a diamine. Option **B** proved to be a popular distractor.

Question 40

The majority of candidates knew that *Terylene* is a polyester.

Paper 5124/02

Paper 2 - Physics

General comments

The scripts showed a wide range of knowledge and ability in the candidates. Less able candidates usually did worse on ***Section B***, for which experience of practical work is important. Practice in the use of basic equipment such as ammeters, voltmeters and stopwatches is essential; candidates should be able to give clear detailed descriptions of their use.

Comments on specific questions

Section A

Question 1

(a) It should be understood that a non-linear speed-time graph shows that the acceleration is not constant, and that unchanging speed indicates no acceleration (for straight-line motion).

(b)(i) Most candidates knew that weight is calculated using W = mg, but many failed to use correct units. Mass must be measured in kg and *g* in N/kg (as given) so that their product is in N.

(ii) The reasoning which leads to the correct answer is that zero acceleration means zero resultant force, so the weight must balance the force of air resistance.

Answers: **(a)(i)** 0 – 0.5 s; **(b)(i)** 0.6 N, **(ii)** 0.6 N.

Question 2

(a)(b) The most frequent error was to use the incorrect distance in the attempts to find the moments. Once again the use of correct units proved difficult. Multiplying a force, (N), by a distance, (m), must give a quantity whose units are Nm.

(c) Few candidates attempted to equate the moment of the weight about the 50cm mark to the sum of the moments in **(a)** and **(b)**.

Answers: **(a)** 0.6 Nm; **(b)** 0.3 Nm; **(c)** 3.0 N.

Question 3

This question was answered well. Most candidates noted that the non-linear graph accounted for the lack of proportionality between load and extension.

Answer: **(a)** 0.75 N.

Question 4

(a) A majority of candidates knew that work is calculated by multiplying force and distance moved in the direction of the force. Yet again, units were often incorrect.

(b) This was a harder question. There are two approaches possible; to use equations of uniform acceleration or to equate the answer to **(a)** to the kinetic energy ½ mv^2.

Answers: **(a)** 48 J; **(b)** 8 m/s.

Question 5

The answers were disappointing in many cases. The essential points, missed by several candidates, were that temperature remains constant during the solidification process and the basic fact that any object warmer than its surroundings will be losing heat.

Answers: **(a)** 50° C; **(c)** 20° C.

Question 6

(a) **B** must be moved backwards and forwards along the line **AB** to produce the desired effect.

(b) The formula $v = f\lambda$ was known by most candidates.

Answer: **(b)** 0.4 m.

Question 7

Most candidates were able to quote the formula n = sin i/sin r but then many were not clear which were the correct angles to substitute in that formula.

Answer: 1.4(6).

Question 8

(a) The term *electromagnetic induction* was not often recalled.

(b) Doubling the rotation rate would produce an increased voltage at double the original frequency.

Question 9

(a)(i) The formula Power = VI is needed to solve this question.

(ii) There was only one sensible choice for the rating of the fuse, as this must always be somewhat higher than the working current.

(b) Attention to units could have helped candidates with this part. A quantity measurable in kWh can be obtained by multiplying a power (in kW) by a time (in hours).

Answers: **(a)(i)** 8.3 A, **(ii)** 10 A; **(b)** 6 kWh.

Question 10

The correct answer is that both beta and gamma radiations were emitted. A frequent mistake was to write down properties of nuclear radiations but then failing to apply those properties to the particular points given in the question.

Section B

Question 11

(a) As noted in the General Comments many candidates did not give clear experimental details. A good approach to answering this type of question is to attempt to write a sequence of instructions that would enable someone else to carry out the experiment.

For an accurate measurement of the period of a pendulum it is necessary to measure the time for one sequence of several oscillations (say 10), rather than having 10 separate measurements of one single oscillation.

(b) The correct term *parallax* was used in many answers, but usually without any further detail

Question 12

(a) The question called for a circuit diagram, so there was more experimental information given in the answers than was the case in **Question 11**. In general the quality of a description of an experiment can be improved with the aid of a diagram, even if it is not specifically requested.

(b) Not many candidates explained that non-ohmic behaviour of a metal occurs when the current is high enough to change the temperature.

Question 13

(a) The answer required recall of the standard calibration procedure for a thermometer. Carelessness caused some candidates to omit the need for *pure* and *melting* ice for the lower fixed point and *boiling* water for the upper fixed point.

(b) The features of the clinical thermometer were usually well known and understood.

Paper 5124/03
Paper 3 - Chemistry

Comments on specific questions

Section A

Question 1

Formulae and uses of common substances

Most candidates knew a symbol for aluminium and the formula for ethanol. Many believed, incorrectly, that helium is used to fill hot air balloons.

Question 2

Classifying substances as elements or compounds or mixtures

This question tested more than simple recall as the examples could not have been experienced by candidates on a previous occasion. Answered well. The classifications were, respectively, compound, element, mixture and compound.

Question 3

Alkanes and alkenes

Good knowledge shown of full structural formula and methods of distinguishing between ethane and ethene. Some candidates found it difficult to determine the relative molecular mass of ethene even when the relative atomic masses of the constituent atoms were supplied.

That dumping polymers causes a problem as a result of their non biodegradable nature and burning polymers causes a problem as a result of the noxious gases so produced were both well known.

Question 4

Manufacture of ammonia

The gas that turns damp red litmus blue is ammonia: the colourless solution is ammonium sulphate solution: the gas needed by industry, with nitrogen, to form ammonia is hydrogen.

Quite a wide range of temperatures and pressures were accepted for those needed in industry to react catalytically nitrogen and hydrogen.

Question 5

Identifying compounds from their physical properties

Several candidates incorrectly gave the properties of metals and non-metals, i.e. good conductor of heat, rather than the properties of the particles in solids and gases, i. e. a solid's particles are closer together than are those in a gas.

The high melting point, good conducting (when liquid) compounds are likely to have ionic bonding. The low melting point, poor conducting (when liquid) compounds are likely to have covalent bonding.

A common error when suggesting why a covalently bonded substance has a lower boiling point than an ionically bonded substance was to state that covalent bonds can be easily broken. This error appeared on many occasions.

Question 6

Catalytic reactions

(a) In this particular case a catalyst speeds up the reaction and at the end of the reaction will not have changed chemically - though 'will not have changed' was accepted, at this level, as being sufficient to earn the full marks. As a consequence, the time taken for the reaction to reach completion will be reduced.

(b) Candidates needed to add to the diagram a thistle funnel, dipping below the level of the liquid in the flask, or a dropping funnel and some means of collecting and measuring the gas that is released during the reaction. Either using gas syringe or water displacement were accepted. Few candidates used a thistle funnel correctly.

Section B

Question 7

Reactivity series

(a) From the given Periodic Table it can be seen that caesium must be more reactive than potassium.

(b) Lithium hydroxide, sodium hydroxide and hydrogen are the product of the two reactions - though responses giving the appropriate ions were accepted for full marks.

(c) Bubbles of a gas (hydrogen) and a vigorous, if not explosive, reaction results if caesium is dropped onto water. The pH of the resulting solution will be higher than 7 as the solution will be alkaline. A full chemical equation must include correct chemical symbols and formulae, correct balancing and correct state symbols. 'aq' was often given, incorrectly, as the state symbol for liquid water.

Question 8

Electronic structures of magnesium and magnesium chloride

(a) Marks were given for: 2.8.2 the magnesium atom's electronic structure; the need for this atom to lose two electrons to reach increased stability; 2.8 as the symbol for the magnesium ion; the ion has a double positive charge.

(b) So that marks could be given for a partly correct electronic structure, they were given for the correct final structures of a magnesium ion and a chloride ion - including correct charges, and the presence of two chloride ions.

Question 9

Lime and limestone - uses and reactions

(a) Many candidates believed that lime is used by farmers as a fertiliser. The use of lime on agricultural land is, of course, to reduce the acidity of the soil. Industrial waste is also treated with lime to reduce the acidity as lime is both relatively inexpensive and an alkali.

(b) The substances were, respectively, calcium carbonate, calcium oxide, carbon dioxide and lime water (calcium hydroxide solution). The correct equation was often given for the action of heat upon calcium carbonate to give calcium oxide (lime) and carbon dioxide.