Fill in these boxes and read what is printed below.

Full name of centre

Town

Forename(s)

Surname

Data of birth

Day    Month    Year

Scottish candidate number

Number of seat

Necessary data will be found in the Chemistry Data Booklet for Intermediate 1 and Access 3 (2002 Edition).

Section A (Questions 1 to 20)

Instructions for the completion of Section A are given on page two.

Section B (Questions 1 to 12)

All questions should be attempted.

The questions may be answered in any order, but all answers are to be written in this answer book, and must be written clearly and legibly in ink.

Rough work, if any, should be necessary, as well as the fair copy, is to be written in this book.

Rough work should be scored through when the fair copy has been written.

Additional space for answers and rough work will be found at the end of the book. If further space is required, supplementary sheets may be obtained from the invigilator and should be inserted inside the front cover of this booklet.

Before leaving the examination room you must give this book to the invigilator. If you do not, you may lose all the marks for this paper.
Check that the answer sheet provided is for Chemistry Intermediate 1 (Section A).

Fill in the details required on the answer sheet.

In questions 1 to 20 of this part of the paper, an answer is given by indicating the choice A, B, C or D by a stroke made in INK in the appropriate place of the answer sheet—see the sample question below.

For each question there is only ONE correct answer.

Rough working, if required, should be done only on this question paper, or on the rough working sheet provided—not on the answer sheet.

At the end of the examination the answer sheet for Section A must be placed inside this answer book.

This part of the paper is worth 20 marks.

SAMPLE QUESTION

To show that the ink in a ball-pen consists of a mixture of dyes, the method of separation would be

A fractional distillation
B chromatography
C fractional crystallisation
D filtration.

The correct answer is B—chromatography. A heavy vertical line should be drawn joining the two dots in the appropriate box in the column headed B as shown in the example on the answer sheet.

If, after you have recorded your answer, you decide that you have made an error and wish to make a change, you should cancel the original answer and put a vertical stroke in the box you now consider to be correct. Thus, if you want to change an answer D to an answer B, your answer sheet would look like this:

A B C D

If you want to change back to an answer which has already been scored out, you should enter a tick (✓) to the RIGHT of the box of your choice, thus:

A B C D OR A B ✓ C D

[X012/101] Page two
This section of the question paper consists of 20 multiple choice questions.

1. Helium, neon and argon are in the same column of the Periodic Table because they are
   A non-metals
   B found in air
   C gases at room temperature
   D elements with similar chemical properties.

2. Sodium fluoride is dissolved in drinking water to
   A kill bacteria
   B make it fizzy
   C prevent lead poisoning
   D protect against tooth decay.

3. Which of the following always occurs in a chemical reaction?
   A A gas is given off.
   B A solid is produced.
   C A new substance is formed.
   D A colour change takes place.

4. Which line in the table correctly describes what happens if 1 gram of a catalyst is involved in a chemical reaction?

<table>
<thead>
<tr>
<th>Speed of reaction</th>
<th>Mass of catalyst left at end in grams</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>unchanged</td>
</tr>
<tr>
<td>B</td>
<td>faster</td>
</tr>
<tr>
<td>C</td>
<td>unchanged</td>
</tr>
<tr>
<td>D</td>
<td>faster</td>
</tr>
</tbody>
</table>
5. The diagram below shows a methane molecule.

![Methane molecule diagram]

Which of the following statements correctly describes this molecule?
A  The atoms are held together by weak bonds.
B  The atoms are held together by strong bonds.
C  The ions are held together by weak bonds.
D  The ions are held together by strong bonds.

6. Which of the following metals is extracted from its ore using electricity?
A  Aluminium
B  Gold
C  Iron
D  Silver

7. Which of the following metals has a density greater than nickel?
(You may wish to use page 3 of the data booklet to answer this question.)
A  Tin
B  Silver
C  Aluminium
D  Magnesium
8. Samples of three metals were each heated and placed in jars of oxygen.

<table>
<thead>
<tr>
<th>Metal</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dull glow</td>
</tr>
<tr>
<td>2</td>
<td>Burst into flames</td>
</tr>
<tr>
<td>3</td>
<td>Glowed brightly</td>
</tr>
</tbody>
</table>

The correct order of reactivity of the metals, putting the most reactive first, is

A 1, 3, 2
B 1, 2, 3
C 2, 3, 1
D 2, 1, 3.

9. Which of the following is a natural fibre?

A Silk
B Nylon
C Kevlar
D Polyester
10. Which of the following should **not** be used to put out an oil fire?

A. sand  
B. water  
C. carbon dioxide  
D. fire blanket

11. The boiling point of a hydrocarbon depends on the size of the hydrocarbon molecule. Which of the following hydrocarbons has the lowest boiling point?

A. \( \text{C}_6\text{H}_{14} \)  
B. \( \text{C}_8\text{H}_{18} \)  
C. \( \text{C}_{10}\text{H}_{22} \)  
D. \( \text{C}_{12}\text{H}_{26} \)

12. Which of the following is a harmful substance produced by the incomplete combustion of diesel?

A. Soot  
B. Water  
C. Hydrogen  
D. Carbon dioxide
13. Polythene is a useful plastic because after it is made it can be heated and re-shaped. However it causes pollution problems because bacteria are unable to break it down.

Polythene can be described as
A thermoplastic and biodegradable
B thermoplastic and not biodegradable
C thermosetting and biodegradable
D thermosetting and not biodegradable.

14. What percentage of body weight is water?
A Less than 30%
B Approximately 40%
C Approximately 50%
D More than 60%

15. Which sugar is used as table sugar?
A Fructose
B Glucose
C Maltose
D Sucrose

16. The results of tests carried out on a piece of food are shown in the table.

<table>
<thead>
<tr>
<th>Food test</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rubbing food on filter paper</td>
<td>Oily mark</td>
</tr>
<tr>
<td>Iodine test</td>
<td>Stays brown</td>
</tr>
<tr>
<td>Benedict's test</td>
<td>Turns brick-red</td>
</tr>
<tr>
<td>Heating with soda lime</td>
<td>No gas produced</td>
</tr>
</tbody>
</table>

The food contained
A fat and protein
B fat and glucose
C starch and glucose
D protein and starch.
17. The graph below can be used to determine weight conditions.

A man with a height of 1.70 metres weighs 80 kilograms.
Using the graph, how would he be described?
A Underweight
B Ideal
C Overweight
D Obese

18. Which element is found in proteins but not in carbohydrates?
A Carbon
B Hydrogen
C Nitrogen
D Oxygen

19. Which type of food produces amino acids during digestion?
A Carbohydrates
B Fats
C Oils
D Proteins
20. Alcohol is made by the fermentation of glucose. Distillation can then be used to
A increase the alcohol concentration
B decrease the alcohol concentration
C increase the glucose concentration
D decrease the glucose concentration.

Candidates are reminded that the answer sheet MUST be returned INSIDE this answer book.
SECTION B

40 marks are available in this section of the paper.

1. Crude oil is a fossil fuel.

   (a) Name another fossil fuel.

   ____________________________

   (b) Crude oil is separated into different fractions in a refinery.

   ____________________________  1

   (i) Name the process used to separate crude oil into fractions.

   ____________________________  1

   (ii) Naphtha can be used to make petrol.

   A petrol tanker has the following hazard-warning symbol on it.

   ____________________________

   What does this hazard-warning symbol tell you about petrol?

   ____________________________  1 (3)
2. (a) Farmers use herbicides to control weeds. The diagram shows a molecule of a herbicide.

\[
\begin{align*}
\text{C} & \quad \text{H} & \quad \text{O} & \quad \text{N} & \quad \text{C} & \quad \text{O} & \quad \text{H} \\
\text{H} & \quad \text{O} & \quad \text{P} & & & & \\
\text{H} & \quad \text{O} & \quad \text{C} & \quad \text{N} & \quad \text{C} & \quad \text{C} & \quad \text{O} & \quad \text{H} \\
\text{O} & \quad \text{H} & \quad \text{H} & \quad \text{H} & \quad \text{H} &
\end{align*}
\]

Complete the formula to show the number of each type of atom in this molecule.

\[
\begin{align*}
\text{C} & \quad \text{H} & \quad \text{O} & \quad \text{N} & \quad \text{P}
\end{align*}
\]

1

(b) Why do crops not grow as well when weeds are present?

---

---

---

1

(c) What type of compound can farmers use to prevent diseases in plants?

---

1

(3)

[Turn over]
3. The results from a student's PPA write-up are shown below.

### Intermediate 1 Chemistry

<table>
<thead>
<tr>
<th>Testing the pH of Solutions</th>
<th>Unit 1 PPA 3</th>
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</thead>
<tbody>
<tr>
<td>Name: Tom Fleming</td>
<td>Teacher's Initials:</td>
</tr>
<tr>
<td>Date:</td>
<td></td>
</tr>
</tbody>
</table>

#### ASSESSMENT SHEET

What was the aim of the experiment?

To find the pH of some household substances and classify them as acidic/alkaline/neutral.

#### Results

<table>
<thead>
<tr>
<th>Substance</th>
<th>pH</th>
<th>Acidic/alkaline/neutral</th>
</tr>
</thead>
<tbody>
<tr>
<td>vinegar</td>
<td>4</td>
<td>acidic</td>
</tr>
<tr>
<td>bicarbonate of soda</td>
<td>12</td>
<td>alkaline</td>
</tr>
<tr>
<td>dilute household ammonia</td>
<td>11</td>
<td>alkaline</td>
</tr>
<tr>
<td>lemon juice</td>
<td>5</td>
<td>acidic</td>
</tr>
<tr>
<td>sugar</td>
<td></td>
<td>neutral</td>
</tr>
</tbody>
</table>

(a) How would the student use the colour chart to get the pH value?

(b) Complete the table above to show the pH value for sugar.

(c) Describe what the student would have to do with a **solid** substance before going on to test its pH value.
4. The table shows the chemical names of four ores.

<table>
<thead>
<tr>
<th>Ore</th>
<th>Chemical name</th>
</tr>
</thead>
<tbody>
<tr>
<td>bauxite</td>
<td>aluminium oxide</td>
</tr>
<tr>
<td>galena</td>
<td>lead sulphide</td>
</tr>
<tr>
<td>malachite</td>
<td>copper carbonate</td>
</tr>
<tr>
<td>sphalerite</td>
<td>zinc sulphide</td>
</tr>
</tbody>
</table>

The graph shows how much metal is produced each year from these ores.

(a) Which ore is a compound made up of **three** elements?

(b) How much metal is produced each year from the ore galena?

___________________________ million tonnes

**[Turn over]**
5. The diagram shows a simple battery made from everyday materials. This battery has a **tin case**. The case is in contact with a **paste**. The other metal in the battery is **copper**. The voltage produced by the battery can be measured using a **voltmeter**.

(a) Use the information above to label the diagram of the battery.

(b) The paste is made from porridge and salt solution.

(i) The salt solution provides ions. Why are ions needed?

(ii) Porridge is mainly made of starch. Describe how you would test the porridge to prove that it contains starch.
6. Manufacturers are now producing liquid detergents in capsule form.
The capsules have a plastic coating which dissolves in water.

(a) Name the process used to make plastics?

(b) Describe how you would show whether the plastic coating dissolves faster at higher or lower temperatures.
You may wish to use some or all of the apparatus shown below.
You may use other apparatus if required.
7. Coating iron with other metals can be used to prevent iron from rusting.

(a) How does the metal coating prevent the iron from rusting?

(b) What name is given to the process of coating iron with zinc?

(c) Some metals will protect iron from rusting even when the coating is scratched.
   A student set up the test tubes shown below.

<table>
<thead>
<tr>
<th>Iron coated</th>
<th>Iron coated</th>
<th>Iron coated</th>
</tr>
</thead>
<tbody>
<tr>
<td>with copper</td>
<td>with tin</td>
<td>with zinc</td>
</tr>
<tr>
<td>salt water</td>
<td>salt water</td>
<td>salt water</td>
</tr>
<tr>
<td>scratch</td>
<td>scratch</td>
<td>scratch</td>
</tr>
</tbody>
</table>

(i) What other substance needs to be added to the test tubes to show if the iron is protected from rusting?

(ii) Complete the table to show the results you would expect.
(You may wish to use page 6 of the data booklet to answer this question.)

<table>
<thead>
<tr>
<th>Metal used to coat iron</th>
<th>Does iron rust?</th>
</tr>
</thead>
<tbody>
<tr>
<td>copper</td>
<td></td>
</tr>
<tr>
<td>tin</td>
<td></td>
</tr>
<tr>
<td>zinc</td>
<td></td>
</tr>
</tbody>
</table>
8. Caffeine is found in many foods and can alter the way our body works.

(a) What name is given to a substance which alters the way our body works?

(b) The table shows the mass of caffeine in different foods.

<table>
<thead>
<tr>
<th>Food</th>
<th>Mass of caffeine in milligrams</th>
</tr>
</thead>
<tbody>
<tr>
<td>cup of coffee</td>
<td>65</td>
</tr>
<tr>
<td>cup of tea</td>
<td>40</td>
</tr>
<tr>
<td>can of cola</td>
<td>40</td>
</tr>
<tr>
<td>50 g bar of chocolate</td>
<td>80</td>
</tr>
</tbody>
</table>

(i) Draw a bar graph to show the mass of caffeine in different foods. (Additional graph paper, if required, will be found on page 23.)

(ii) A student ate a 100 g bar of chocolate and drank a can of cola. Calculate the mass of caffeine in the student's food.

______ milligrams 1

(4)
9. (a) During photosynthesis green plants make **glucose**.

![Diagram of photosynthesis]

- Carbon dioxide
- Oxygen
- Water

(i) Write a word equation for photosynthesis.

```

glucose + carbon dioxide + water \rightarrow oxygen
```

1

(ii) Name the substance in green plants which absorbs light during photosynthesis.

```

light
```

1

(b) The level of carbon dioxide in the atmosphere has increased in recent years.

(i) Give **one** reason why the level of carbon dioxide in the atmosphere has increased.

```

Increase in transportation and industrial activities.
```

1
9. (b) (continued)

(ii) The graph shows how the level of carbon dioxide in the atmosphere has changed since 1980.

Predict the level of carbon dioxide in the atmosphere in 2005 if the trend continues.

__________ units of carbon dioxide

(4)

[Turn over]
10.

Intermediate 1
Chemistry

Re: Reaction of Metals with Acid

Unit 2
PPA 2

- Procedure (what you do)

1. Add dilute hydrochloric acid to the beaker until it is half full.

2. Put three test tubes in the test tube rack. Pour some of the hydrochloric acid into the first test tube to a depth of about 4 cm. Pour the same volume of acid into the other two test tubes.

3. Add a piece of zinc to the first test tube. Add a piece of magnesium to the second test tube. Add a piece of copper to the third test tube.

(a) What is the aim of the experiment?

(b) During the experiment, the volume of the acid must be kept the same. State another factor which the student would need to keep the same in each of the three experiments.

(c) Name the salt formed during the reaction between magnesium and hydrochloric acid.

\[ \text{zinc} \quad \text{magnesium} \quad \text{copper} \]

1

Page twenty
11. The pie chart shows the percentage of phosphoric acid used to make other substances.

(a) Give one reason why a food might contain a food additive.

(b) 50 million tonnes of phosphoric acid are produced in the world each year. Calculate the mass of phosphoric acid used to make animal feed each year.

(c) How does using detergent help to remove grease when washing dishes?

(d) Name the element in calcium phosphate fertiliser which is essential for healthy plant growth.

[Turn over for Question 12 on Page twenty-two]
12. Some coal contains sulphur. This forms sulphur dioxide when the coal burns in air.

(a) Write the formula for sulphur dioxide.

______________________________

1

(b) Air is a mixture of nitrogen and oxygen.
What percentage of the air is oxygen?

______________________________

1

(c) What is produced when sulphur dioxide dissolves in water in the atmosphere?

______________________________

1 (3)

[END OF QUESTION PAPER]
Scottish Qualifications Authority

Intermediate 1 Chemistry - 2003 Examination

Paper 1A

Statistical Data from Sample of Candidates

<table>
<thead>
<tr>
<th>Syllabus Item</th>
<th>Section</th>
<th>Ability</th>
<th>Facility</th>
<th>r</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Omit</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>1ai</td>
<td>KU</td>
<td>0.38</td>
<td>0.35</td>
<td>37</td>
<td>6</td>
<td>19</td>
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<td>KU</td>
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<td>8</td>
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<td>0.09</td>
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<td>11</td>
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<td>6</td>
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