



BOARD OF STUDIES
NEW SOUTH WALES

**1998
SCHOOL
CERTIFICATE
EXTERNAL
TEST–Trial**

16 November

SCIENCE

SECTION 2

**QUESTION
& ANSWER
BOOKLET**

CENTRE NUMBER

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STUDENT NUMBER

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Directions for Section 2

- 1 You should allow about 45 minutes to answer Section 2
- 2 Section 2: Questions 26–29 (25 marks)
- 3 Attempt ALL questions in Section 2
- 4 Calculators may be used in Section 2
- 5 Complete your answers to Section 2 in this booklet
- 6 Do NOT write in pencil
- 7 Necessary working should be shown
- 8 Write your Centre Number and Student Number at the top of this page

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QUESTION 26. (4 marks)

Scientific discoveries and new technologies have an impact on our society.

Name a scientific discovery or new technology and explain two positive and two negative effects it has had on society.

Name of discovery/technology

Positive effect 1

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Positive effect 2

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Negative effect 1

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Negative effect 2

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QUESTION 28. (7 marks)

Modern society depends heavily on metals. More than 60 metals are extracted from the earth and used. Each metal has its own properties which include strength, hardness, conduction of electricity and heat, resistance to corrosion, density, and chemical activity.

Some metals are used more than others. This depends on the properties of the metal and how much it costs. The cost depends on how abundant the metal is and how easily we can mine and refine the ore. The more chemically active a metal is, the faster it will corrode and the harder it is to extract from its ore.

Even though new reserves of metal ores are being found, supplies must eventually run out. There are two important ways we are trying to solve this problem:

- recycling
- using substitute materials.

The table shows information about some metals.

<i>Metal</i>	<i>Atomic symbol</i>	<i>World production (thousands of tonnes per year)</i>	<i>Density (g mL⁻¹)</i>	<i>Chemical activity</i>	<i>Estimated time known reserves will last (years)</i>	
magnesium	Mg	300	1.7	Most ↑ active	500+	
aluminium	Al	15 700	2.7		260	
zinc	Zn	9 000	7.1		150	
chromium	Cr	6 000	7.1		100	
iron	Fe	750 000	7.9		200	
tin	Sn	800	7.3		100	
lead	Pb	5 000	11.3		150	
copper	Cu	12 000	8.9		40	
silver	Ag	10	10.5		Least ↓ active	150
gold	Au	2	19.3			25

QUESTION 28. (Continued)

(a) Ignoring cost, and using only the information provided,

(i) give a disadvantage of making a car out of gold;

.....

(ii) explain an advantage of making a car out of gold.

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(b) Aluminium is the most abundant metal in the Earth's crust. Despite its abundance, aluminium is one of the more expensive to obtain. Using only the information provided, suggest a reason for this.

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(c) Use the information given, or your knowledge, to answer the following questions.

(i) Name a property of metals for which it is difficult to use substitute materials. Explain your answer.

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(ii) Suggest one reason why most of the copper we use is recycled.

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(iii) Suggest one reason why less than half of the iron we use is recycled.

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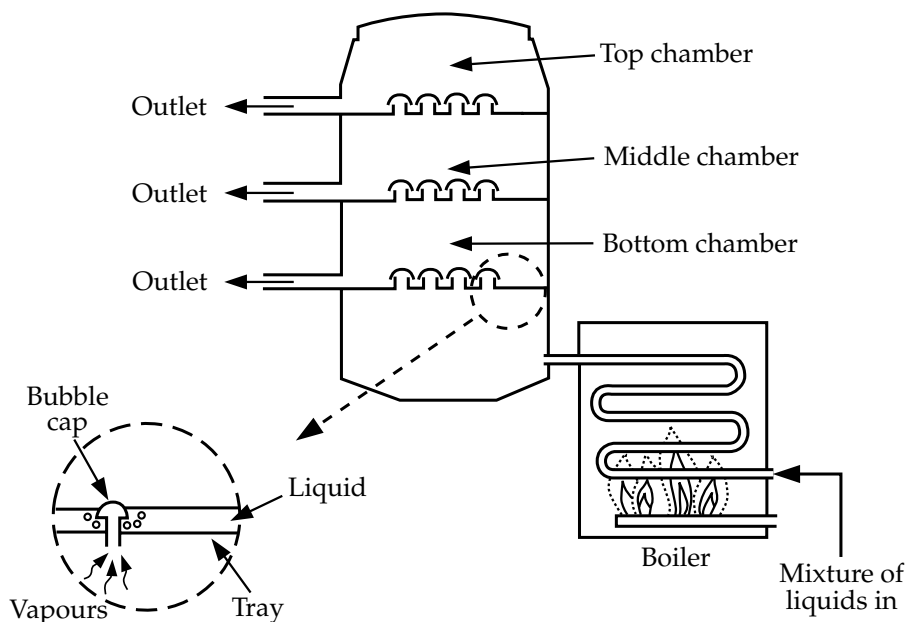
(iv) The world reserves of copper are predicted to run out in 40 years. Suggest one way this might affect people.

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QUESTION 29. (9 marks)

Fractional distillation is used to separate mixtures of liquids of different boiling points. The diagram shows a simple distillation column.



The mixture is added to the boiler and heated. Vapours formed pass into the column at the bottom where it is hottest. The vapours rise up the column passing from chamber to chamber through the bubble caps. The vapour condenses when it reaches a chamber where the temperature is lower than its boiling point. Liquids of different boiling points collect in different trays and are drawn off through the outlets.

A mixture of liquids *P*, *Q* and *R* is added to the boiler.

The boiling points of *P*, *Q* and *R* and the amount of each collected after one litre of mixture had been distilled are shown in the table.

<i>Liquid</i>	<i>Boiling point</i> (°C)	<i>Amount collected</i> (mL)
<i>P</i>	85	410
<i>Q</i>	54	240
<i>R</i>	67	350

QUESTION 29. (Continued)

- (a) (i) Complete the table below by correctly identifying the vapour that would condense in each chamber during the distillation process.

<i>Chamber</i>	<i>Vapour</i>
Top	
Middle	
Bottom	

- (ii) What is the maximum temperature in the middle chamber for the column to work correctly?

.....°C

Explain your answer.

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- (iii) Complete the bar graph below to show the proportion of each liquid in the original mixture. Indicate the liquids in the order *P*, then *Q*, then *R*.



- (b) Is fractional distillation a physical or chemical change?

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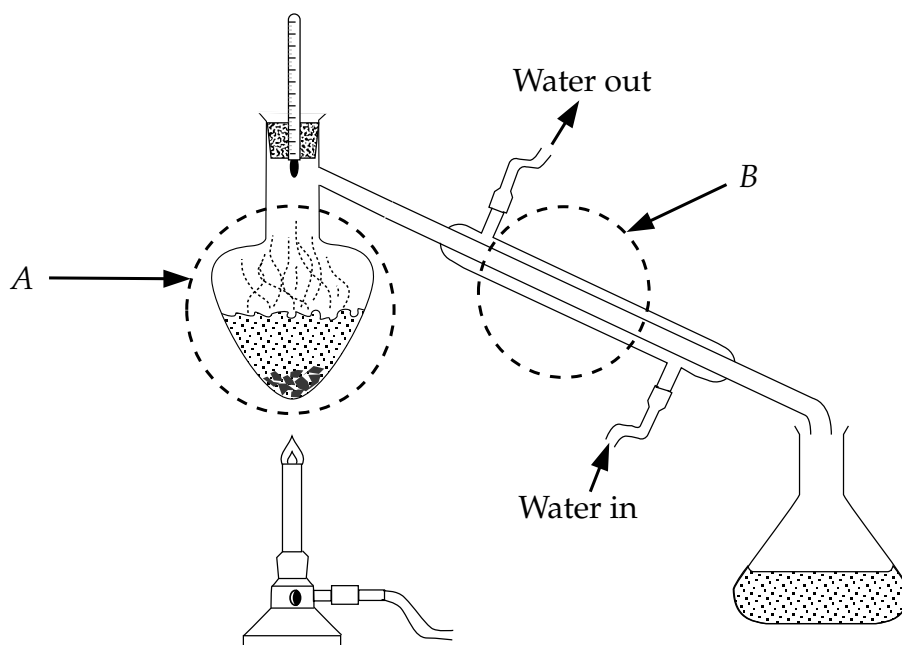
Justify your answer.

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Question 29 continues on page 10

QUESTION 29. (Continued)

- (c) The diagram shows a distillation unit used in a school laboratory to separate two liquids.

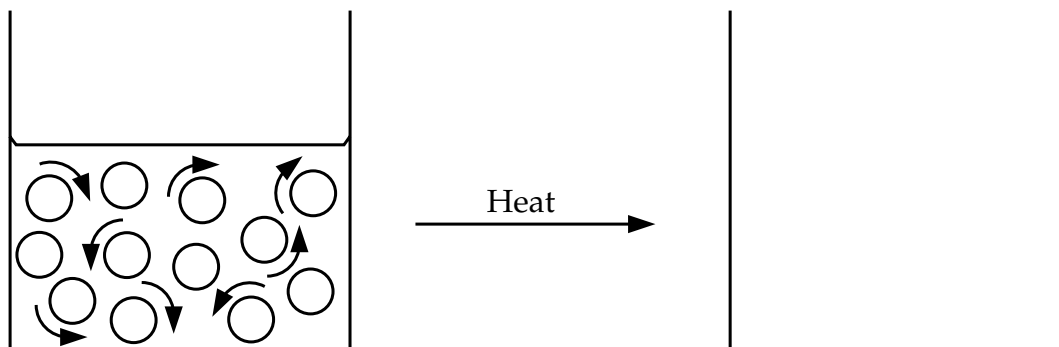


Name the main process occurring in the apparatus at each position indicated.

Process at A

Process at B

- (d) Complete the particle model diagram below to represent evaporation.



End of test

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