CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

SCIENCE (PHYSICS, CHEMISTRY) **5124/01**

Paper 1 Multiple Choice

May/June 2003

1 hour

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, highlighters, glue or correction fluid.
Write your name, Centre number and candidate number on the answer sheet in the spaces provided unless this has been done for you.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A**, **B**, **C**, and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate answer sheet.

Read the instructions on the Answer Sheet very carefully.

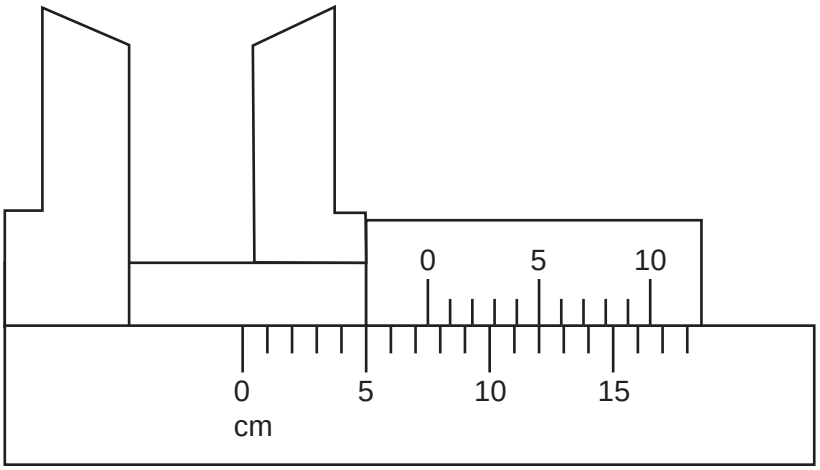
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
A copy of the Periodic Table is included on page 16.

This document consists of **14** printed pages and **2** blank pages.

UNIVERSITY of CAMBRIDGE
Local Examinations Syndicate

[Turn over

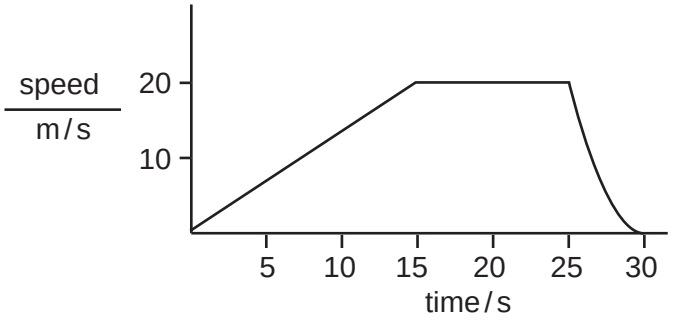
1 Vernier calipers are used to measure the internal diameter of a pipe.



What reading is shown on the vernier calipers?

A 5.0 cm **B** 7.5 cm **C** 12.0 cm **D** 16.5 cm

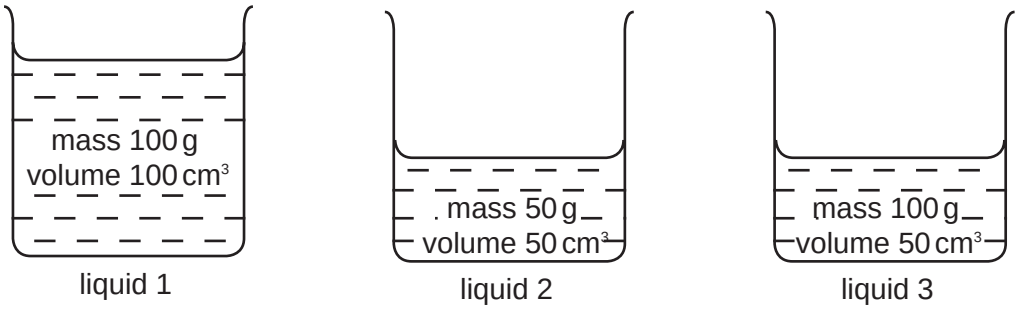
2 The graph shows how the speed of a car changes with time.



How far does the car travel before the brakes are applied?

A 150 m **B** 200 m **C** 350 m **D** 500 m

3 The beakers shown contain three different liquids



Which statement about the densities of the liquids is correct?

A Liquid 1 has twice the density of liquid 3.

B Liquid 3 has twice the density of liquid 2.

C The liquids all have different densities.

D The liquids all have the same densities.

4 Which method of energy release is affected by a change in the Earth's gravitational field?

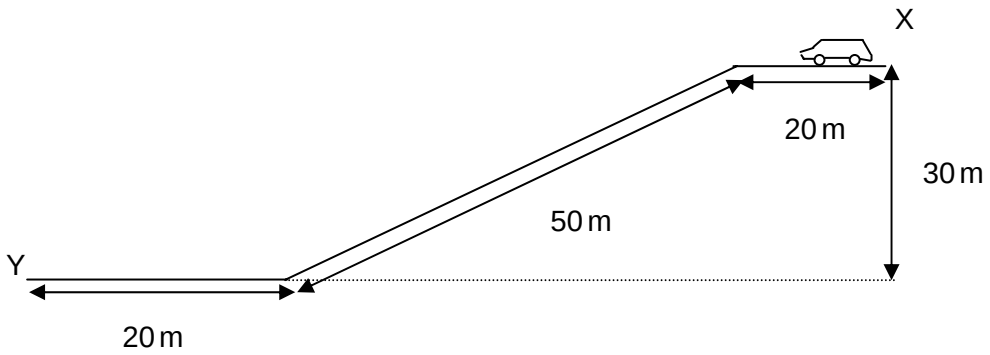
A chemical

B geothermal

C hydroelectric

D nuclear

5 A car of mass 800 kg moves from point X to point Y along a section of level road, down a hill, and along another section of level road. The diagram shows the distances moved.
The acceleration of free fall is 10 m/s^2.



How much potential energy has the car lost in moving from point X to point Y?

A 240 000 J

B 320 000 J

C 400 000 J

D 720 000 J

[Turn over

6 To create a temperature scale two fixed points, the ice point and the steam point, are needed.

Which of the following is used to determine the ice point?

A the temperature at which air liquefies

B the temperature at which sea water freezes

C the temperature of ice in a freezer

D the temperature of melting ice

7 Which of the following allows thermal energy to be transferred by density changes?

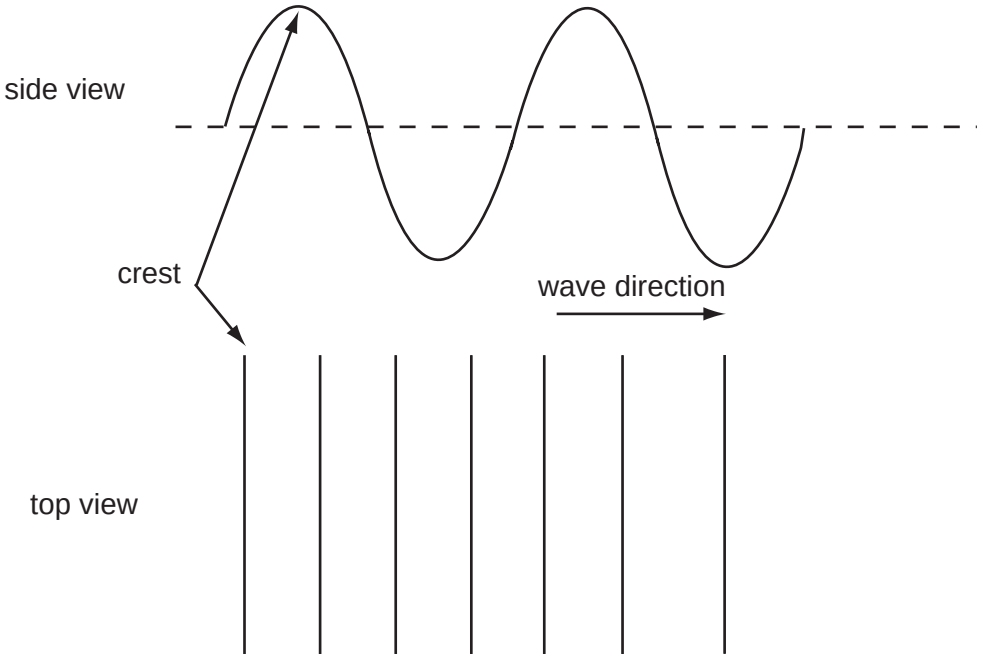
A only solid

B only solid and liquid

C only liquid and gas

D only gas

8 A ripple tank is used to study water waves. The diagram shows a top view and a side view of a wave. A wave crest is marked.



What is the speed of the wave?

A the distance travelled horizontally by a crest in one second

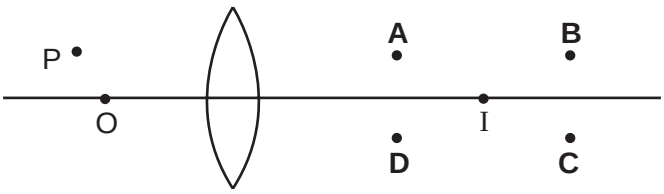
B the distance travelled vertically by a crest in one second

C the number of wave crests passing a point in one second

D the time taken for a crest to make one vibration

9 A lens forms an image at I of an object at O.

Where does the lens form an image of an object at P?



10 X-rays are one form of electromagnetic radiation.

Which of the following is correct for X-rays?

	type of wave	speed of wave in vacuo
A	longitudinal	340 m / s
B	longitudinal	3×10^8 m / s
C	transverse	340 m / s
D	transverse	3×10^8 m / s

11 A marine survey ship sends a sound wave straight down to the sea bed. It receives an echo 1.5 s later. The speed of sound in sea water is 1500 m / s.

How deep is the sea at this position?

A 1000 m **B** 1125 m **C** 2250 m **D** 4500 m

12 Which of the following proves that a piece of metal is already a magnet?

A A magnet is attracted to it.

B Both ends of a compass needle are attracted to it.

C Copper wire is attracted to it.

D One end of a compass needle is repelled by it.

13 Which of the following may be given as joules / coulomb?

A amps **B** ohms **C** volts **D** watts

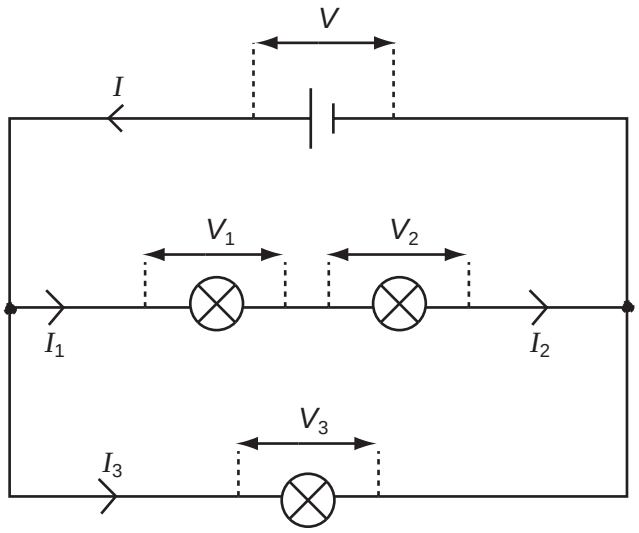
[Turn over

14 A piece of wire 0.5 m long has an area of cross-section of 1 mm^2.

Which piece of wire of the same material has twice the resistance?

	length / m	area / mm^2
A	0.5	2.0
B	0.5	0.5
C	2.0	2.0
D	2.0	0.5

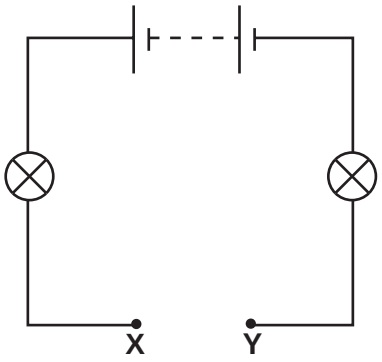
15 The circuit shows identical lamps connected to a cell.



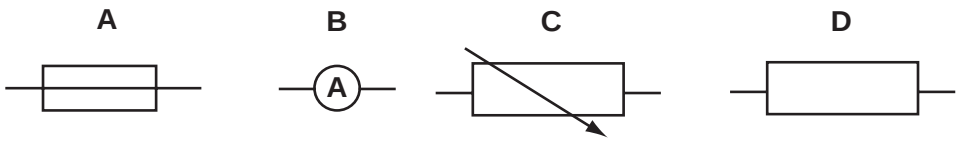
Which pair of equations is correct for this circuit?

	potential difference	current
A	$V = V_1 + V_2 + V_3$	$I = I_1 + I_2 + I_3$
B	$V = V_1 + V_2$	$I = I_1 + I_2$
C	$V = V_1 + V_2$	$I = I_1 + I_3$
D	$V = V_3$	$I = I_3$

16 The diagram shows part of a circuit.



Which component can be connected between **X** and **Y** so that the brightness of the lamps may be varied?



17 An electric cooker is connected to the mains by a 3 core cable.

When the cooker is working correctly which wires carry the same current?

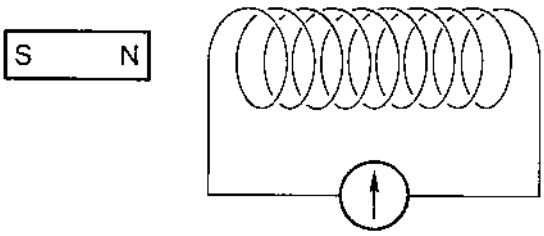
A the live, the neutral and the earth

B the live and the earth

C the neutral and the earth

D the neutral and the live

18 When a magnet was pushed towards a solenoid, the meter connected to the solenoid showed a deflection to the right.



When the same magnet was pulled away from the solenoid at a faster speed, what was the deflection on the meter?

A greater and to the left

B greater and to the right

C the same and to the left

D the same and to the right

19 In a sulphur nucleus there are 16 positively charged particles and 18 neutral particles.

Which are its proton and nucleon numbers?

	proton number	nucleon number
A	16	18
B	16	34
C	18	16
D	18	34

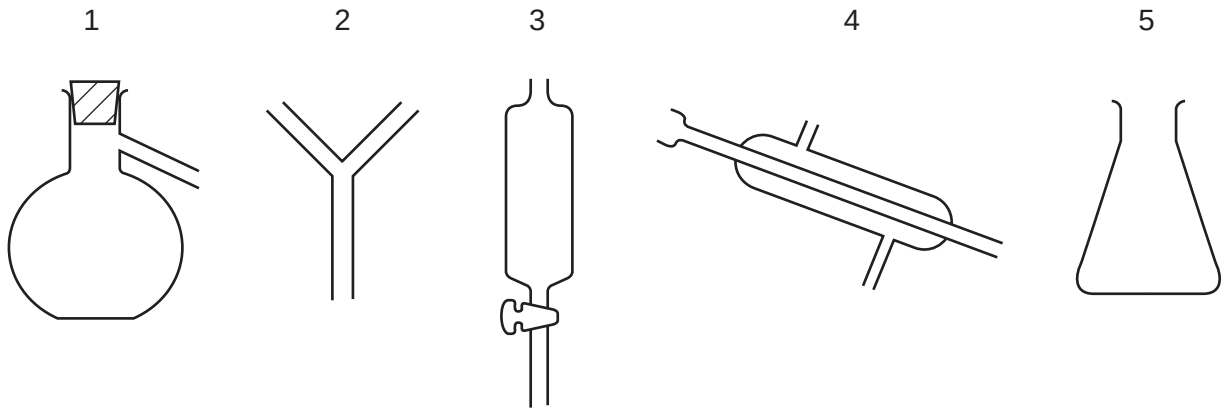
20 The element astatine, At, can decay by alpha emission as shown by the equation below.

$$^{218}_{85}\text{At} \rightarrow {}^{m}_{n}\text{X} + \alpha$$

Which answer corresponds to the value of m and n?

	m	n
A	214	83
B	218	84
C	218	86
D	222	87

21 The diagram shows some laboratory apparatus.



Which are needed to produce and collect pure water from seawater?

A 1 and 2 and 4

B 1 and 4 and 5

C 2 and 5

D 3 and 5

22 Aluminium has the symbol $^{27}_{13}Al$.

Which is a correct line of data for an atom of aluminium?

	number of		
	protons	electrons	neutrons
A	13	14	14
B	13	13	14
C	13	14	27
D	14	13	27

23 Ionic compounds have high melting points because

A the ions are held together by strong electrostatic forces.

B the ions have inert gas structures.

C the electrons are attracted to the cations.

D metals transfer electrons to non-metals.

24 The equation for the reaction between calcium carbonate and hydrochloric acid is shown below.

$$CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + H_2O(l) + CO_2(g)$$

How many moles of calcium carbonate will give 24 cm^3 of carbon dioxide measured at r.t.p. (room temperature and pressure) when reacted with an excess of the acid?

A 1 mol **B** 0.1 mol **C** 0.01 mol **D** 0.001 mol

25 A compound **X** contains 50 % sulphur and 50 % oxygen, by mass.

What is the formula of compound **X**?
(A_r: S, 32; O, 16.)

A SO **B** SO_2 **C** SO_3 **D** S_2O

26 What is always produced during photosynthesis?

A carbon dioxide

B methane

C oxygen

D water vapour

[Turn over

27 When two liquids are mixed, a solution with a pH value of 7 is formed.

Which of the following are the pH values of the two liquids?

	first liquid pH	second liquid pH
A	5	2
B	5	12
C	6	1
D	14	7

28 Which of the following solutions, when mixed together, form an insoluble salt?

A dilute hydrochloric acid and barium nitrate

B dilute sulphuric acid and sodium hydroxide

C dilute hydrochloric acid and lead(II) nitrate

D dilute sulphuric acid and zinc chloride

29 Which of the following describes a step in the preparation of insoluble barium sulphate from aqueous barium chloride and dilute sulphuric acid?

A Add dilute sulphuric acid until no more gas is produced.

B Add Universal Indicator.

C Collect the precipitate of barium sulphate by filtration.

D Evaporate the filtrate until it crystallises.

30 The table shows some properties of four metals.

Which metal is in Group I of the Periodic Table?

metal	density	hard or soft
A	low	soft
B	low	hard
C	high	soft
D	high	hard

31 Which deduction about astatine, At, can be made from its position in Group VII.

A It forms covalent compounds with sodium.

B It is displaced from aqueous potassium astatide, KAt, by chlorine.

C It is a gas.

D It is more reactive than iodine.

32 The table gives information on four metals and some of their compounds.

metal	action of dilute sulphuric acid on metal	effect of hydrogen on heated oxide	action of a metal on the solution of the sulphate of metal J
G	hydrogen evolved	reduced	no reaction
H	no reaction	reduced	no reaction
I	hydrogen evolved	no action	metal J formed
J	hydrogen evolved	no action	no reaction

What is the order of reactivity of these metals?

	most reactive		→	least reactive
A	H	G	I	J
B	H	J	G	I
C	I	J	G	H
D	I	H	G	J

33 Which statement about the production of iron from haematite is correct?

A Coke is used to oxidise the slag.

B Limestone is used to remove basic impurities.

C Molten iron floats on slag at the furnace base.

D The haematite is reduced by carbon monoxide.

34 Which of the following gases is **most** common in air?

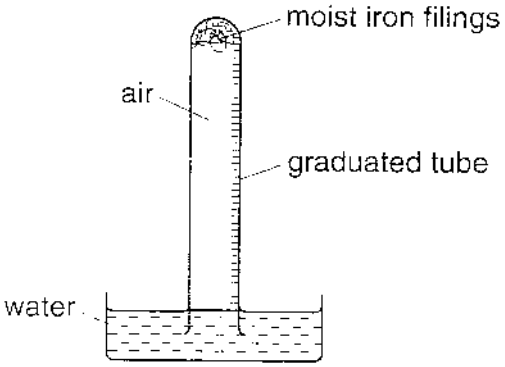
A argon

B carbon dioxide

C oxygen

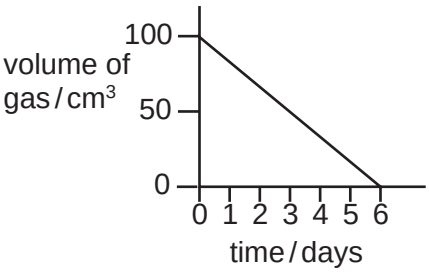
D water vapour

35 The apparatus shown was set up with 100 cm^3 volume of air in the tube. The volume of gas in the tube was measured at intervals for six days.

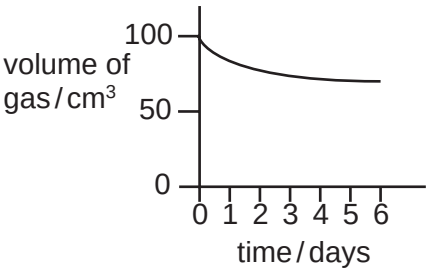


Which graph best represents how the volume of gas changes with time?

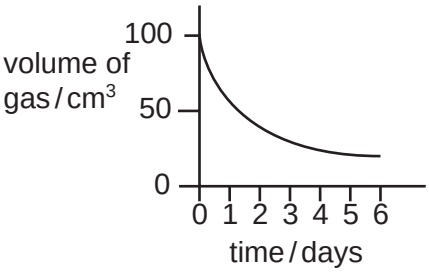
A



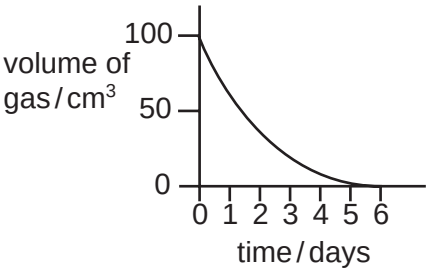
B



C



D



36 What is the main constituent of natural gas?

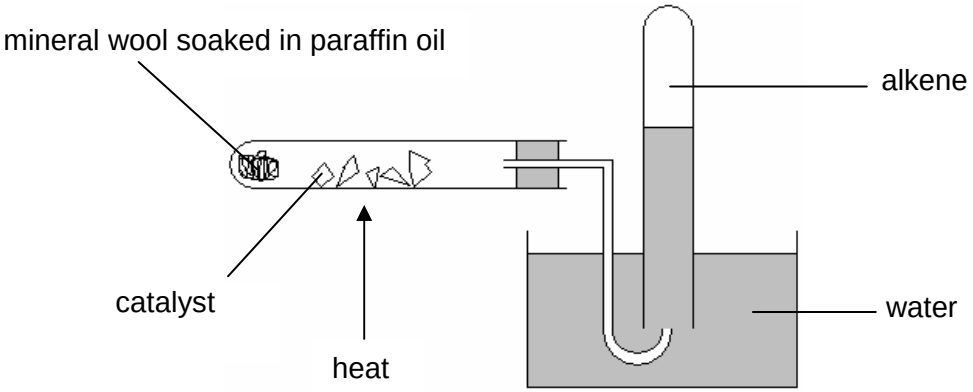
A ethane

B helium

C hydrogen

D methane

37 The apparatus shown is used in the laboratory to form alkenes from paraffin oil.



Artist
Put miniscus on both water levels.
Curve bend in tube coming out of horizontal test-tube.
Put curved tips on test-tubes

What type of reaction is taking place?

A combustion

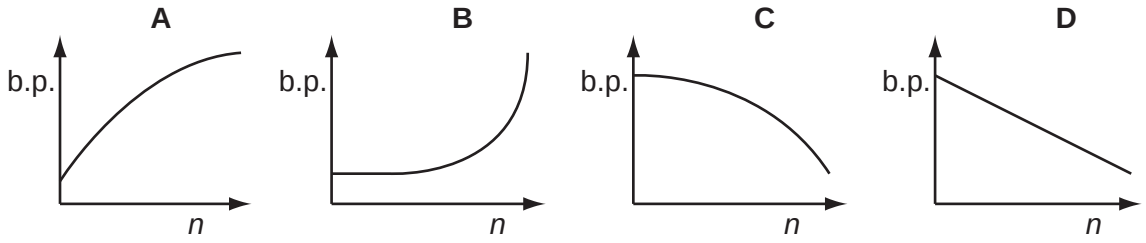
B cracking

C distillation

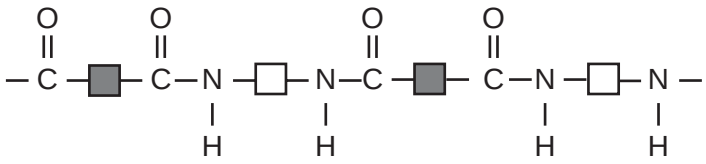
D reduction

38 In the alkane series of hydrocarbons, C_nH_{2n+2}, the boiling point (b.p.) of the compound increases as *n* increases.

Which graph correctly represents this effect?



39 From which pair of reagents could the following polyamide be manufactured?



A HOOC—▩—COOH and H_2N—▩—NH_2

B HOOC—▩—NH_2 and HOOC—□—NH_2

C HOOC—□—NH_2 and HOOC—□—NH_2

D HOOC—▩—COOH and H_2N—□—NH_2

[Turn over

40 What type of compound is *Terylene*?

A a carbohydrate

B a polyamide

C a polyester

D a protein

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