

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

SCIENCE (PHYSICS, CHEMISTRY)

5124/01

Paper 1 Multiple Choice

October/November 2005

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.

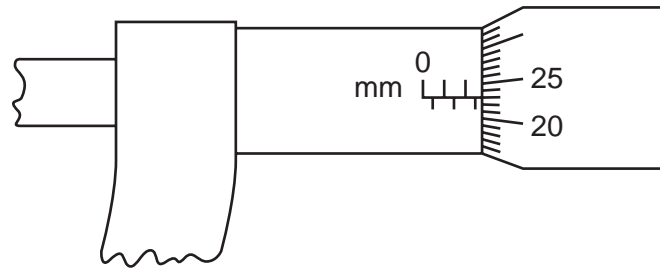
Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page 20.

This document consists of **17** printed pages and **3** blank pages.

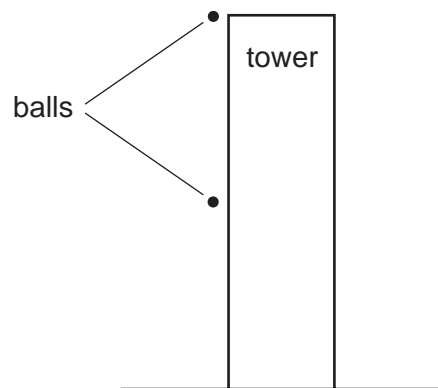


- 1 The diagram shows a micrometer.



Which reading is shown?

- A 2.23 mm B 2.73 mm C 3.23 mm D 5.23 mm
- 2 Two identical balls are released from a tower at the same time. Initially at rest, one falls from the top of the tower and the other from half way.



Which quantity is the same for both balls?

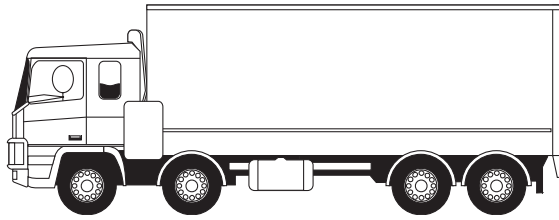
- A acceleration
 B final speed
 C time of travel
 D total increase in velocity
- 3 A block of mass 20 kg is pushed along a road with a force of 30 N. The frictional force is 10 N.



What is the acceleration of the block?

- A 0.67 m/s^2 B 1.0 m/s^2 C 1.5 m/s^2 D 2.0 m/s^2

- 4 The diagram shows a lorry.



What is the best position for its centre of mass and why is it placed there?

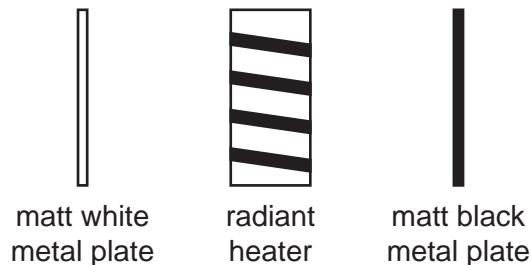
	best position	reason for the position
A	as high as possible	the lorry can accelerate more rapidly
B	as high as possible	the lorry is more stable
C	as low as possible	the lorry can accelerate more rapidly
D	as low as possible	the lorry is more stable

- 5 A body moving with a speed of 30 m/s has a kinetic energy of 1800 J.

What is its mass?

- A** 120 kg **B** 60 kg **C** 4 kg **D** 2 kg

- 6 Two identical metal plates are painted, one matt white and the other matt black. These are placed at equal distances from a radiant heater as shown. The heater is turned on for five minutes.

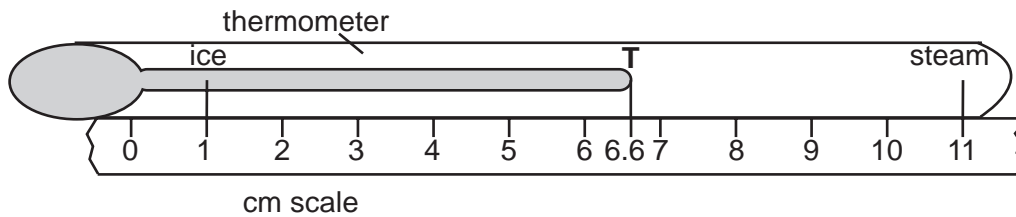


Which metal plate absorbs more energy and which plate emits more energy in this time?

	absorbs more	emits more
A	black	black
B	black	white
C	white	black
D	white	white

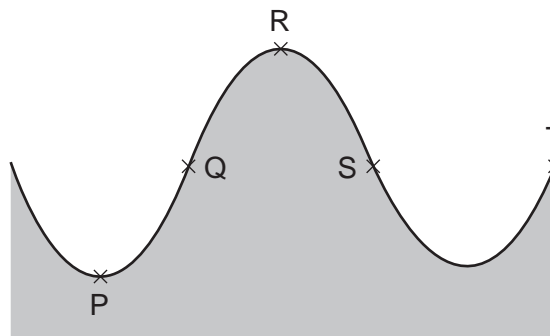
- 7 A cm scale is fixed next to an unmarked mercury-in-glass thermometer.

The ice point and the steam point are marked.



What is the temperature if the mercury is at T?

- A 44°C B 56°C C 60°C D 66°C
- 8 The diagram shows waves travelling on the sea.



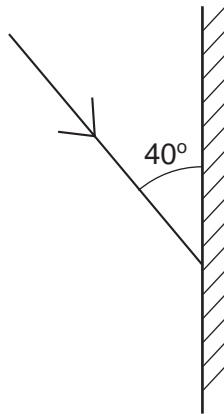
Which points are one wavelength apart?

- A P and R B Q and S C Q and T D S and T
- 9 A surf-board moves at a speed of 5 m/s on the crest of a wave. The distance between successive wave crests is 10 m .

What is the frequency of the wave motion?

- A 0.5 Hz B 2 Hz C 5 Hz D 10 Hz

10 The diagram shows a single ray of light being directed at a plane mirror.



What are the angles of incidence and reflection?

	angle of incidence	angle of reflection
A	40°	40°
B	40°	50°
C	50°	40°
D	50°	50°

11 What is the approximate range of audible frequencies for a young person?

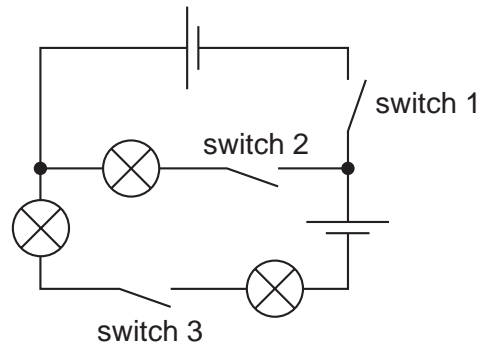
- A** 1 Hz to 2 kHz
- B** 20 Hz to 20 kHz
- C** 20 kHz to 200 kHz
- D** 1000 kHz to 20 000 kHz

12 A battery moves a charge of 60 C around a circuit in a time of 20 s.

What is the average current in the circuit?

- A** 0.3 A
- B** 3.0 A
- C** 40 A
- D** 1200 A

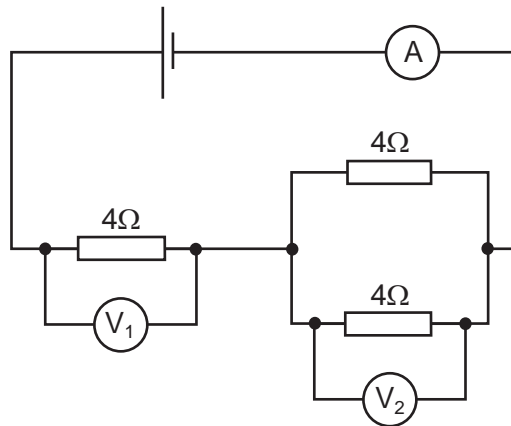
13 A circuit is set up as shown.



Which switch setting lights all three lamps?

	switch 1	switch 2	switch 3
A	closed	closed	open
B	closed	open	closed
C	open	closed	closed
D	open	closed	open

14 In the circuit shown the reading on the ammeter is 1 A.



What would be the readings shown by the voltmeters V_1 and V_2 ?

	V_1	V_2
A	2V	2V
B	2V	4V
C	4V	4V
D	4V	2V

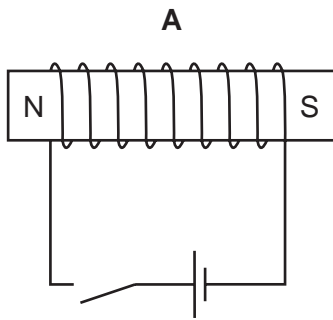
- 15 A person uses a 3 kW electric fire for 2 hours and a 2 kW heater for 4 hours.

What is the total cost if the price of electrical energy is 5.0 cents per unit (kilowatt-hour)?

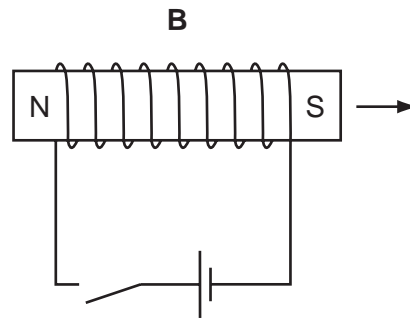
- A 70 cents B 60 cents C 40 cents D 30 cents

- 16 A permanent magnet can be demagnetised by using a solenoid and switching the current on then off.

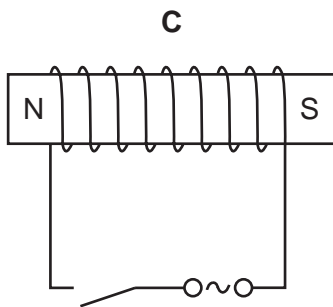
Which diagram shows the most effective method of producing demagnetisation?



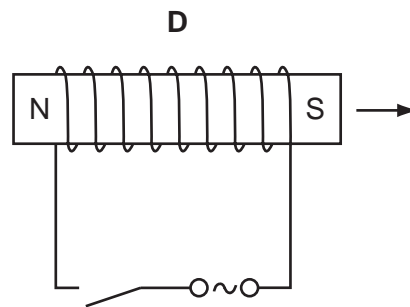
magnet left in place



magnet withdrawn
before switching off

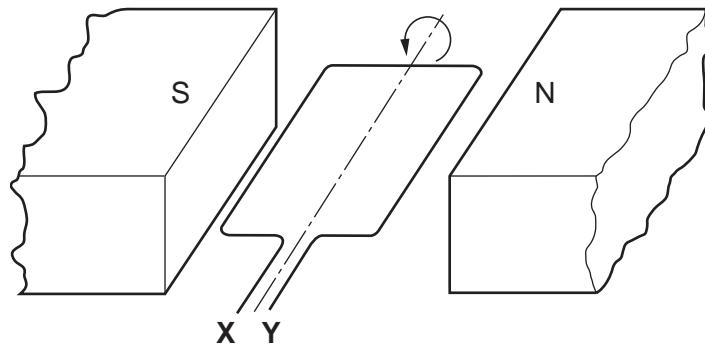


magnet left in place



magnet withdrawn
before switching off

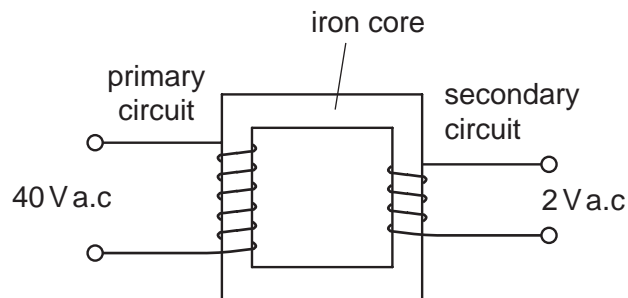
17 The diagram shows a coil in a magnetic field.



When the coil is part of an a.c. generator, what must be connected directly to **X** and **Y**?

- A a.c. supply
- B carbon brushes
- C slip rings
- D soft-iron core

18 The diagram shows a transformer which is 100% efficient. The primary current is 0.5A.



What will be the secondary current?

- A 0.025A
- B 0.5A
- C 1A
- D 10A

19 Which table correctly identifies the locations of protons, neutrons and electrons in an atom?

A

	nucleus	
	inside	outside
electrons	✓	
neutrons	✓	
protons		✓

B

	nucleus	
	inside	outside
electrons		✓
neutrons	✓	
protons	✓	

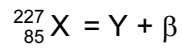
C

	nucleus	
	inside	outside
electrons	✓	
neutrons		✓
protons		✓

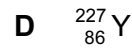
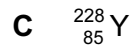
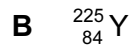
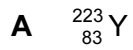
D

	nucleus	
	inside	outside
electrons		✓
neutrons		✓
protons	✓	

20 A radioactive nucleus X, decays by emitting a beta-particle to form a nucleus, Y.

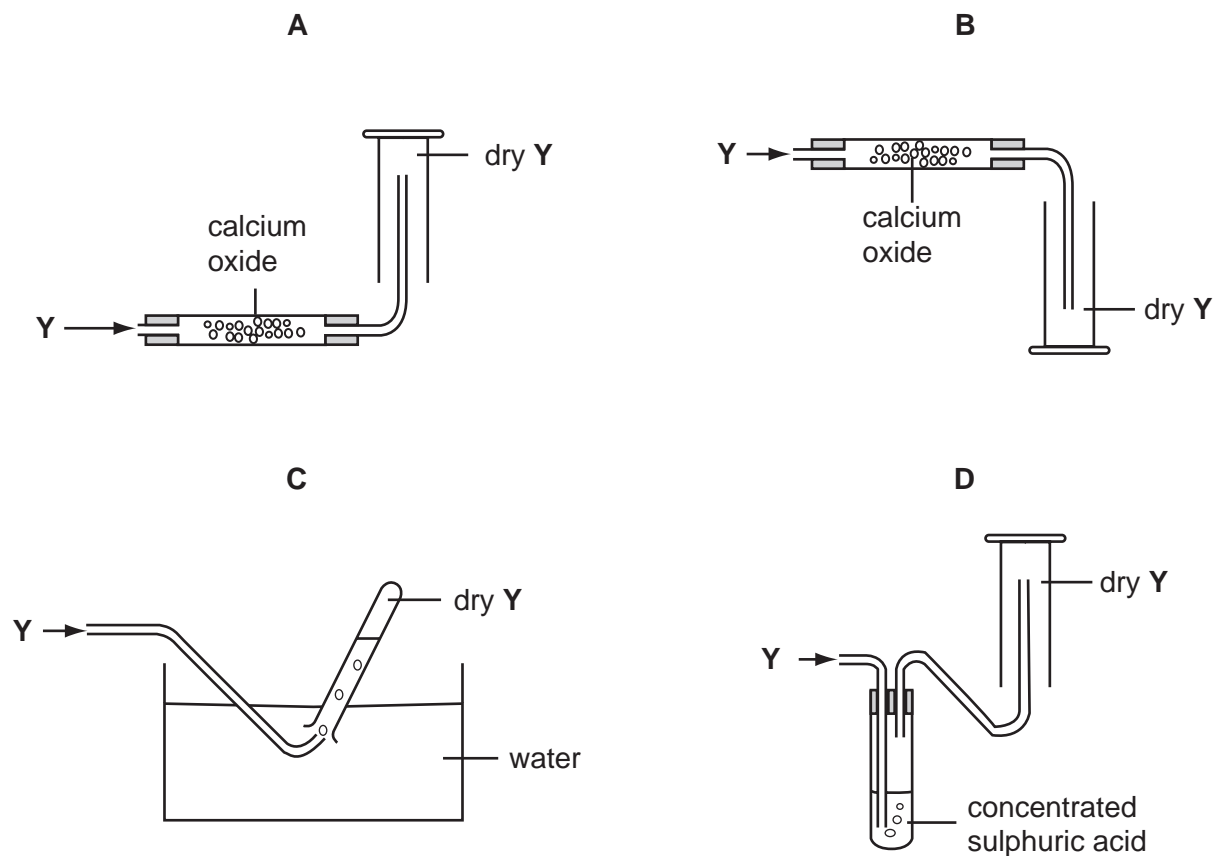


What represents nucleus Y?



21 A gas Y, is less dense than air, very soluble in water and is an alkali.

Which method is used to collect a dry sample of the gas?



22 Which changes occur when a liquid at 50°C becomes a gas at 120°C?

	separation of particles	energy of particles	attractive force between particles
A	decreases	increases	decreases
B	decreases	decreases	increases
C	increases	increases	decreases
D	increases	decreases	increases

23 A nucleus is represented by the symbol ${}_{37}^{81}\text{X}$.

What does this nucleus contain?

- A** 37 electrons and 44 neutrons
- B** 37 neutrons and 81 protons
- C** 37 protons and 44 neutrons
- D** 37 protons and 81 neutrons

24 Element X has an electronic structure 2.8.8.1.

Element Y has an electronic structure 2.8.6.

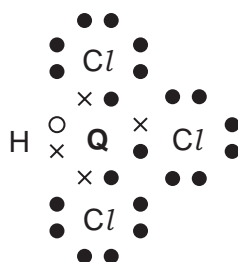
What is made when X and Y react?

	type of compound	formula
A	covalent compound	X_2Y
B	covalent compound	XY_2
C	ionic compound	X_2Y
D	ionic compound	XY_2

25 Element Q has four electrons in its outermost shell.

Element Q can combine with hydrogen and chlorine to form a compound $QHCl_3$.

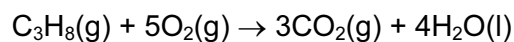
The diagram shows the electronic structure of $QHCl_3$ (outer shell electrons only).



Which of these properties will this compound have?

- A** It will be a solid at room temperature.
- B** It will be readily soluble in water.
- C** It will be a good conductor of electricity.
- D** It will have a low boiling point.

26 Propane burns completely in oxygen as shown in the equation.

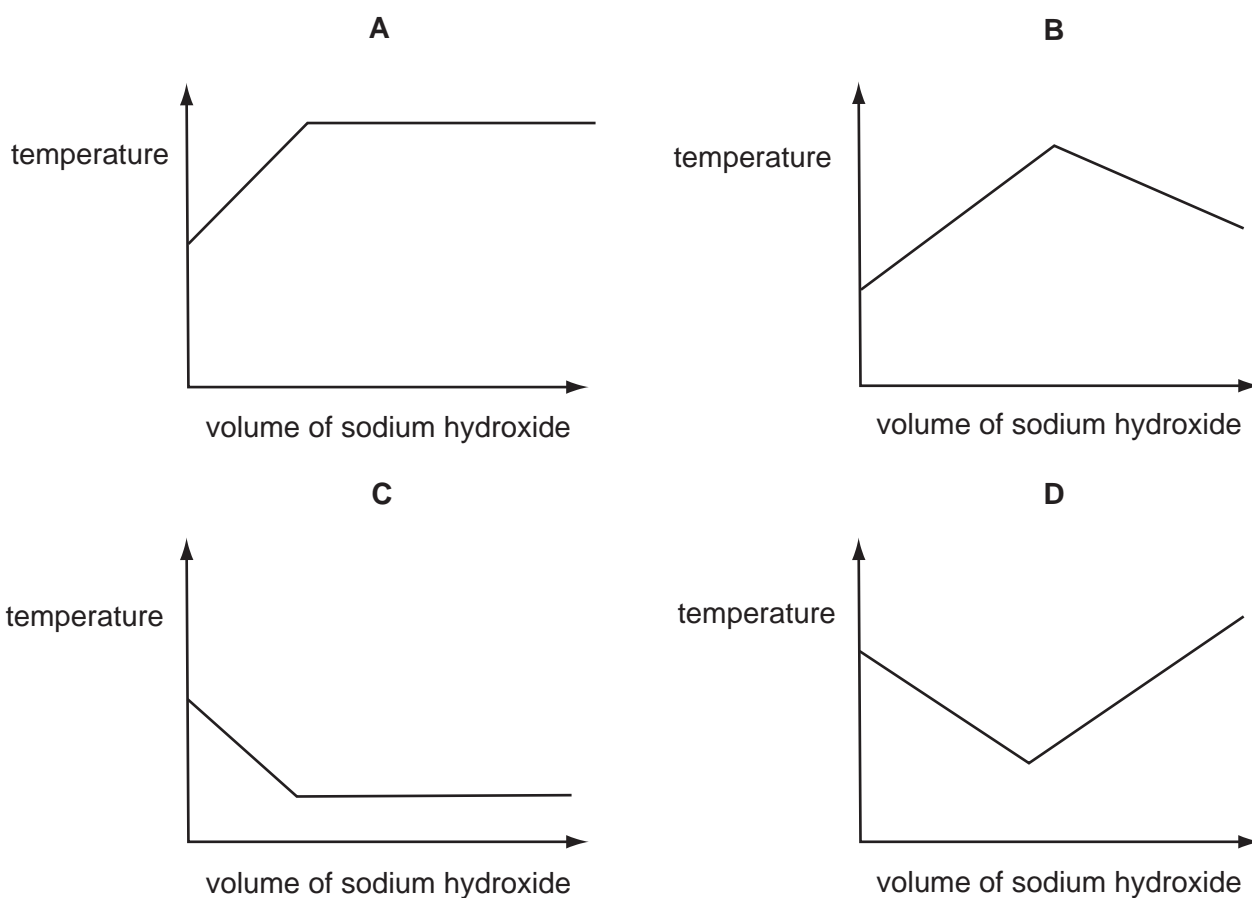


If 0.1 mol of propane is burnt completely, which volume of gaseous product is obtained, measured at room temperature and pressure?

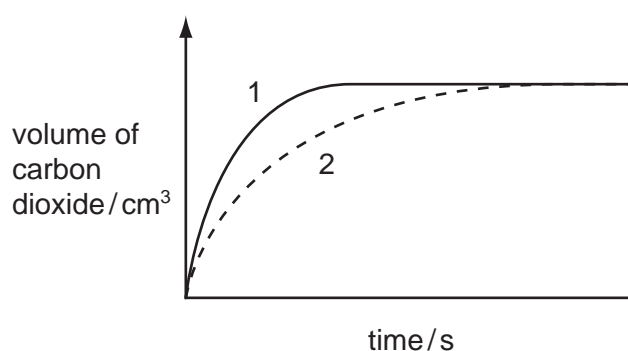
- A** 0.1 dm³
- B** 0.3 dm³
- C** 2.4 dm³
- D** 7.2 dm³

27 The reaction between aqueous sodium hydroxide and hydrochloric acid is exothermic.

Which graph shows the change in temperature when aqueous sodium hydroxide is added to hydrochloric acid until the alkali is present in excess?



28 Curve 1 shows the volume of carbon dioxide given off when 5 g of calcium carbonate lumps react completely with an excess of hydrochloric acid at 40°C.



What change could produce curve 2?

- A use a more concentrated solution of the acid
- B use a lower temperature
- C use 3 g of calcium carbonate lumps
- D use 5 g of calcium carbonate powder

- 29 Aqueous potassium sulphate can be prepared by titrating dilute sulphuric acid against aqueous potassium carbonate.

Which conclusion can be drawn from this information?

- A** Potassium carbonate is insoluble in water.
B Potassium carbonate neutralises sulphuric acid.
C Potassium sulphate is a base.
D Potassium sulphate is insoluble in water.

- 30 The table shows the results of halogen displacement experiments.

halogen added	halide solution		
	X ⁻	Y ⁻	Z ⁻
X ₂	–	Y ₂ displaced	Z ₂ displaced
Y ₂	no reaction	–	no reaction
Z ₂	no reaction	Y ₂ displaced	–

What are halogens X, Y and Z?

	X	Y	Z
A	Br	Cl	I
B	Br	I	Cl
C	Cl	Br	I
D	Cl	I	Br

- 31 The results of adding some metals to salt solutions are shown below.

copper + zinc sulphate → no reaction

magnesium + zinc sulphate → magnesium sulphate + zinc

copper + silver sulphate → copper(II) sulphate + silver

What is the order of reactivity of the metals?

	most reactive	→			least reactive
A	magnesium	copper	zinc	silver	
B	magnesium	zinc	copper	silver	
C	silver	copper	zinc	magnesium	
D	zinc	magnesium	silver	copper	

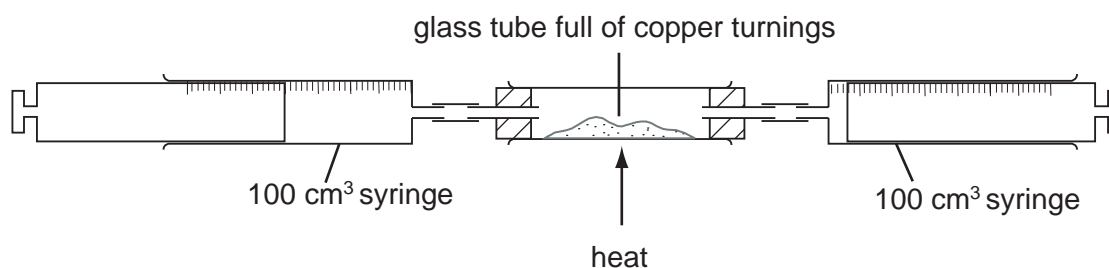
32 Which statement about the production of iron from haematite is correct?

- A Coke is used to oxidise the slag.
- B Limestone is used to produce oxygen for the coke to burn.
- C Molten iron floats on slag at the furnace base.
- D The haematite is reduced by carbon monoxide.

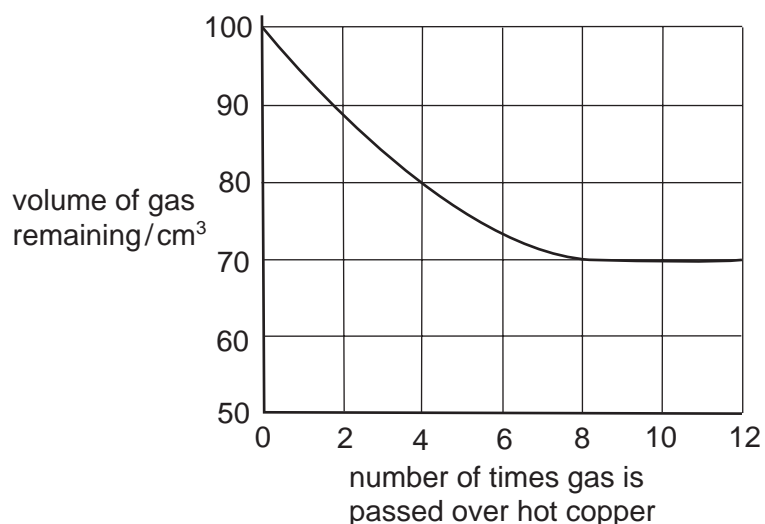
33 Why is aluminium used to make food containers that are resistant to corrosion?

- A It does not react with acids.
- B It forms a covalent oxide.
- C It forms an alloy with zinc.
- D It has a protective oxide layer on its surface.

34 A 100 cm^3 sample of bottled gas used for diving was placed in a gas syringe in the apparatus shown.



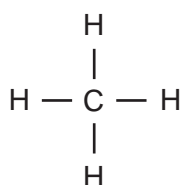
The gas was passed backward and forward over heated copper turnings. The results obtained were used to plot the graph.



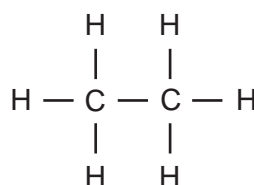
What is the percentage of oxygen in the bottled gas?

- A 20%
- B 30%
- C 70%
- D 80%

- 35 All the members of a homologous series have the same
- A empirical formula.
 - B general formula.
 - C molecular formula.
 - D physical properties.
- 36 What does **not** happen in the complete combustion of propane, C_3H_8 ?
- A a deposit of soot is formed
 - B carbon-carbon bonds break
 - C carbon-oxygen bonds form
 - D energy is released
- 37 The names and molecular structure of two alkanes are shown.



methane



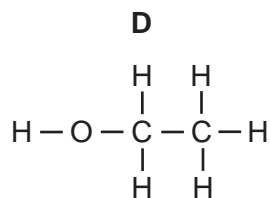
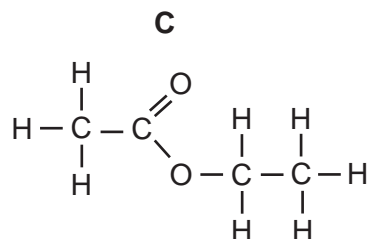
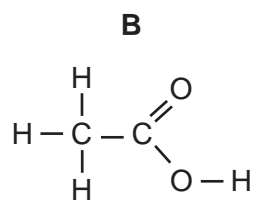
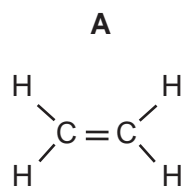
ethane

What is the next alkane in the homologous series?

	name	formula
A	butane	C_3H_6
B	butane	C_3H_8
C	propane	C_3H_6
D	propane	C_3H_8

- 38 Which compound will decolourise aqueous bromine?
- A ethane
 - B ethanoic acid
 - C ethene
 - D poly(ethene)

39 Which structure shows a compound that reacts with ethanol to give an ester?



40 Which of the following is a polyester?

- A** nylon
- B** poly(ethene)
- C** protein
- D** *Terylene*

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DATA SHEET
The Periodic Table of the Elements

		Group										
		I	II	III	IV	V	VI	VII	VIII	IX	X	
1	1											
7	9	1										
3	4	5	6	7	8	9	10	11	12	13	14	
19	20	21	22	23	24	25	26	27	28	29	30	
37	38	39	40	41	42	43	44	45	46	47	48	
55	56	57	58	59	60	61	62	63	64	65	66	
87	88	89	90	91	92	93	94	95	96	97	98	
119	120	121	122	123	124	125	126	127	128	129	130	
157	158	159	160	161	162	163	164	165	166	167	168	
187	188	189	190	191	192	193	194	195	196	197	198	
225	226	227	228	229	230	231	232	233	234	235	236	
87	88	89	90	91	92	93	94	95	96	97	98	
119	120	121	122	123	124	125	126	127	128	129	130	
157	158	159	160	161	162	163	164	165	166	167	168	
187	188	189	190	191	192	193	194	195	196	197	198	
225	226	227	228	229	230	231	232	233	234	235	236	

*58-71 Lanthanoid series
90-103 Actinoid series

	a	X	b
Key	a = relative atomic mass	X = atomic symbol	b = proton (atomic) number

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).