CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

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

Paper 1 Multiple Choice

October/November 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.

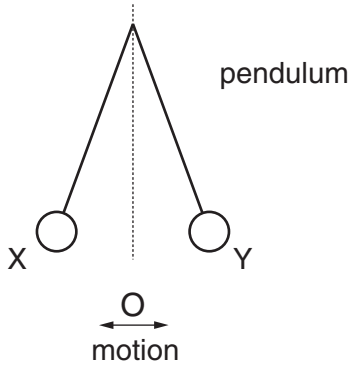
Read the instructions on the Answer Sheet very carefully.

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 **16** printed pages.

University of Cambridge Local Examinations Syndicate
[Turn over

1 The diagram shows a simple pendulum. It swings between X and Y.



Which sequence should be timed to measure the period of the pendulum?

A X → O

B X → Y

C X → Y → O

D X → Y → X

2 An object falls through a vacuum where there is no air resistance.

Which line in the table describes the acceleration and velocity of the object?

	acceleration	velocity
A	constant	constant
B	constant	increasing
C	increasing	constant
D	increasing	increasing

3 An astronaut has a mass of 80 kg on Earth. He can jump 10 cm high off the surface of the Earth.

When he is on the Moon he can jump higher than this.

This is because, on the Moon,

A his mass is smaller than on Earth.

B his weight is greater than on Earth.

C his weight is smaller than on Earth.

D his weight is the same as on Earth.

4 A stone of mass 400 g is lowered into a measuring cylinder containing water.

The water level rises from 300 cm^3 to 500 cm^3.

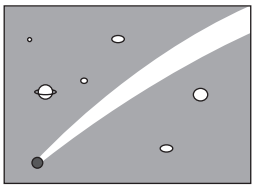
What is the density of the stone?

A 0.50 g / cm^3 **B** 0.80 g / cm^3 **C** 1.33 g / cm^3 **D** 2.0 g / cm^3

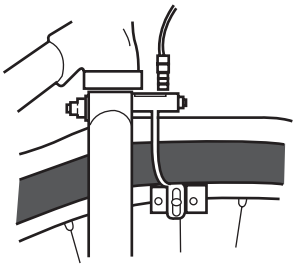
5 The diagrams show some effects which are all due to the same cause.

a parachutist reaching terminal velocity

a meteor glowing as it falls through the atmosphere



brakes slowing down a bicycle



What causes these effects?

A friction

B heat

C mass

D weight

6 A ball of mass 100 g is balanced on the edge of a ledge 10 m above the ground. It rolls off the ledge and falls.

How much gravitational potential energy is lost when the ball falls to the ground?
(gravitational field strength = 10 N / kg.)

A 10 J **B** 100 J **C** 1000 J **D** 10 000 J

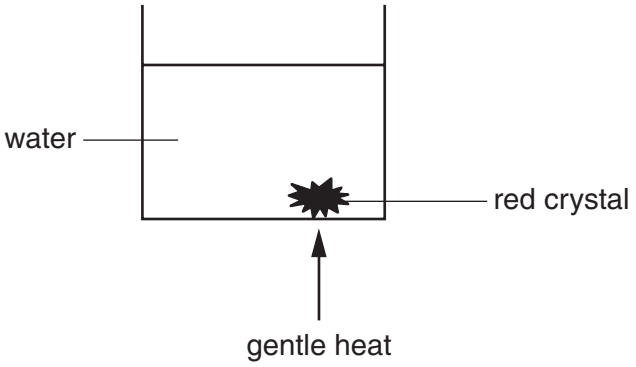
7 Which substance in the table is liquid at 20 °C?

substance	melting point / °C	boiling point / °C
A	–218	–183
B	–39	357
C	44	280
D	119	444

[Turn over

8 A beaker of water contains a red crystal which slowly dissolves.

Gentle heat is applied below the crystal.



The red colour is seen to rise.

What is the name of this process?

A evaporation

B conduction

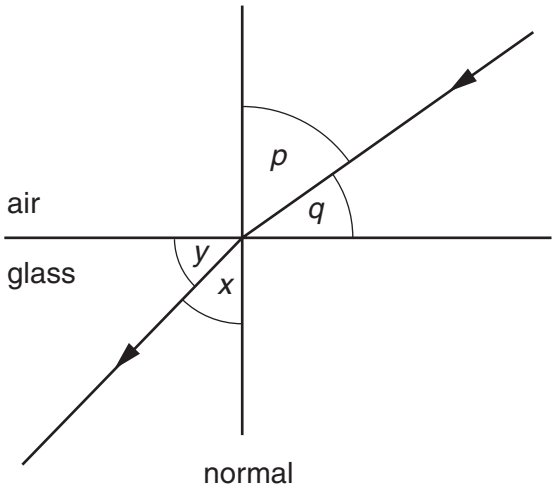
C convection

D radiation

9 Which of the following correctly describes the natures of sound, light and radio waves?

	sound	light	radio
A	longitudinal	transverse	longitudinal
B	longitudinal	transverse	transverse
C	transverse	longitudinal	longitudinal
D	transverse	longitudinal	transverse

10 The diagram shows a ray of red light passing from air into glass.



Which ratio gives the refractive index for red light?

A $\frac{\sin p}{\sin x}$

B $\frac{\sin p}{\sin y}$

C $\frac{\sin q}{\sin x}$

D $\frac{\sin q}{\sin y}$

11 Which of the following, in the electromagnetic spectrum, has the shortest wavelength?

A infrared

B microwave

C radio

D ultra-violet

12 A loud sound is made in front of a tall building.

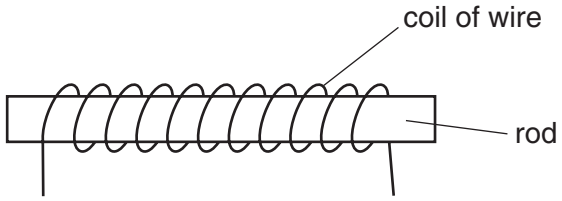
An echo is heard 4 seconds after the sound is produced.

If the speed of sound in air is 320 m / s, how far away is the building?

A 80 m **B** 160 m **C** 640 m **D** 1280 m

[Turn over

13 An experiment was carried out using four rods made of different materials. These were placed, in turn, in a coil of wire.



A large direct current was passed through the coil for a few seconds and was then switched off.

As a result one of the rods was **permanently** magnetised by this experiment.

Which material?

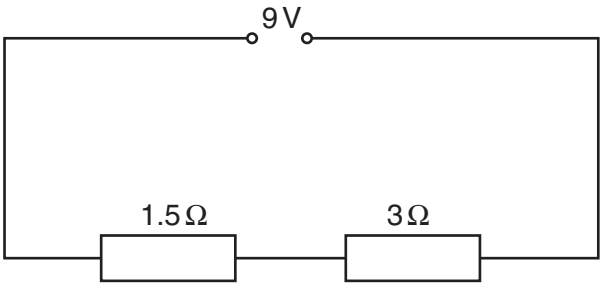
A glass

B iron

C plastic

D steel

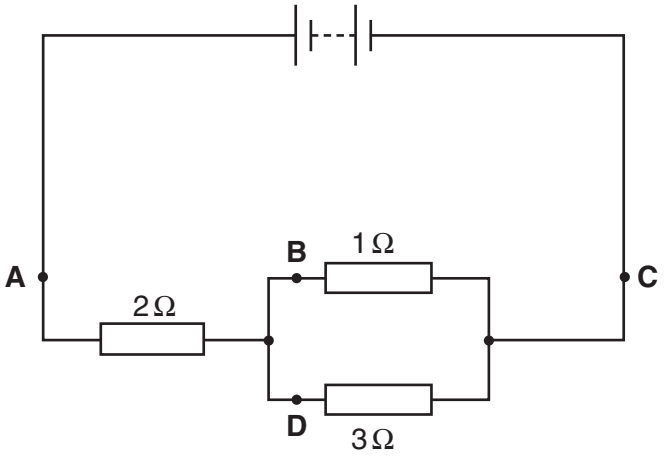
14 Two resistors are connected in series with a 9 volt supply.



What is the current flowing in the circuit?

A 2.0 A **B** 3.0 A **C** 4.5 A **D** 6.0 A

15 At which point in this circuit is the current the smallest?



16 What should be the rating for a fuse used in the plug of an electric heater?

A just less than the normal heater current

B exactly equal to the normal heater current

C just greater than the normal heater current

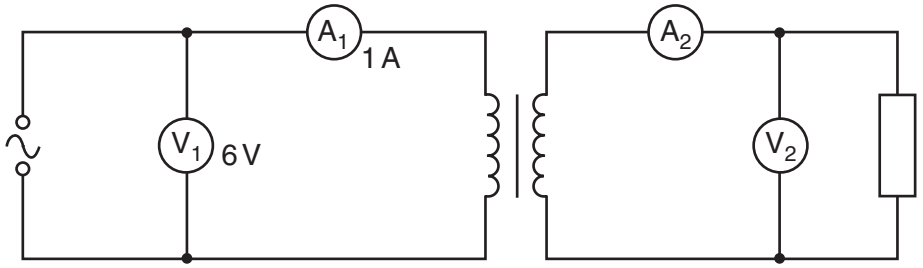
D much greater than the normal heater current

17 Four electrical appliances are left switched on for different times.

In which appliance is the greatest amount of energy converted?

	appliance	time / h
A	100 W light bulb	12.0
B	1 kW fan	3.0
C	1.5 kW hot-plate	1.5
D	3 kW water heater	0.5

18 The diagram shows a 100 % efficient **step-up** transformer.



Which pair of readings are possible on meters V_2 and A_2?

	V_2	A_2
A	0.6	0.1
B	0.6	10.0
C	60.0	0.1
D	60.0	10.0

19 A sample contains 12 000 radioactive atoms of a particular nuclide.

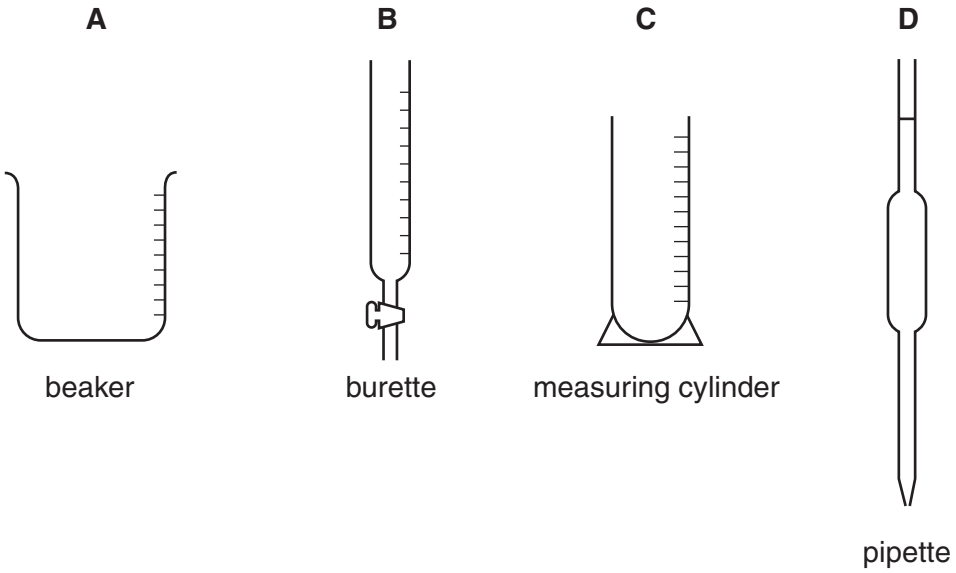
After an interval of two half-lives, how many atoms have disintegrated?

A 0 **B** 3000 **C** 6000 **D** 9000

20 How many neutrons and protons does one atom of substance ${}^{A}_{Z}X$ have in its nucleus?

	number of neutrons	number of protons
A	Z - A	A
B	A - Z	Z
C	Z	A
D	A	Z

21 Which piece of apparatus is used to measure exactly 22.5 cm^3 of a liquid?



22 What can be deduced from the symbol $^{4}_{2}He$?

A An atom of helium contains 2 electrons.

B An atom of helium has 2 protons and 4 neutrons in its nucleus.

C Helium has a proton (atomic) number of 4.

D Helium occurs as a diatomic molecule.

23 Substance **X** has the following properties

1 it conducts electricity when molten
2 it has a high melting point
3 it dissolves in an aqueous solution of hydrochloric acid

What is **X**?

A copper

B ethanol

C iodine

D sodium chloride

24 A 6 g sample of pure carbon is completely burned in oxygen.

$$C + O_2 \rightarrow CO_2$$

Which mass of carbon dioxide is produced?

A 12 g

B 22 g

C 38 g

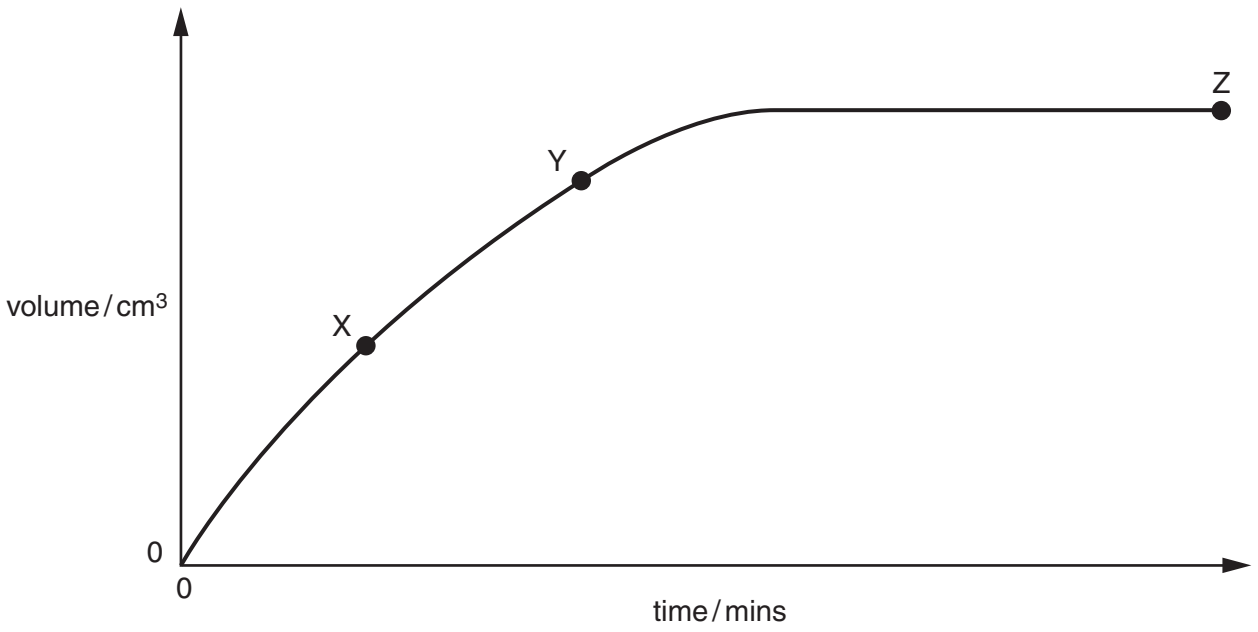
D 44 g

25 The formula of copper(I) oxide is Cu_2O.

How many grams of oxygen are combined with 64 g of copper in this compound?

A 8 **B** 16 **C** 32 **D** 64

26 The graph shows the total volume of carbon dioxide evolved, plotted against time, when excess calcium carbonate reacts with 20 cm^3 of hydrochloric acid containing 2 mol/dm^3.



Which statement is correct?

A The reaction is faster at point Y than at point X.

B The reaction first reaches completion at point Z.

C The time taken to reach completion decreases if 20 cm^3 of hydrochloric acid containing 4 mol/dm^3 is used.

D The total volume of carbon dioxide evolved is greater if a greater mass of calcium carbonate is used.

27 Which word describes the reaction between hydrochloric acid and sodium hydroxide?

A electrolysis

B neutralisation

C precipitation

D thermal decomposition

28 Four aqueous solutions have the pH values shown in the table.

solution	P	Q	R	S
pH	2	6	8	10

If pairs of solutions are mixed, which pair **must** produce an acidic mixture?

A P and Q **B** P and R **C** P and S **D** Q and R

29 Which two substances react to form a salt and water only?

A dilute ethanoic acid and aqueous sodium hydroxide

B dilute hydrochloric acid and zinc

C dilute sulphuric acid and aqueous sodium carbonate

D aqueous silver nitrate and aqueous sodium chloride

30 Which arrangement of electrons is that of a gas normally used to fill light bulbs?

A 2 **B** 2, 6 **C** 2, 8, 2 **D** 2, 8, 8

31 What is used to decide the order of the elements in the Periodic Table?

A density

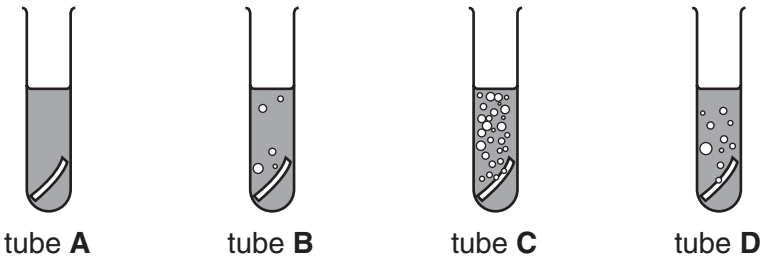
B number of neutrons

C number of protons

D relative atomic mass

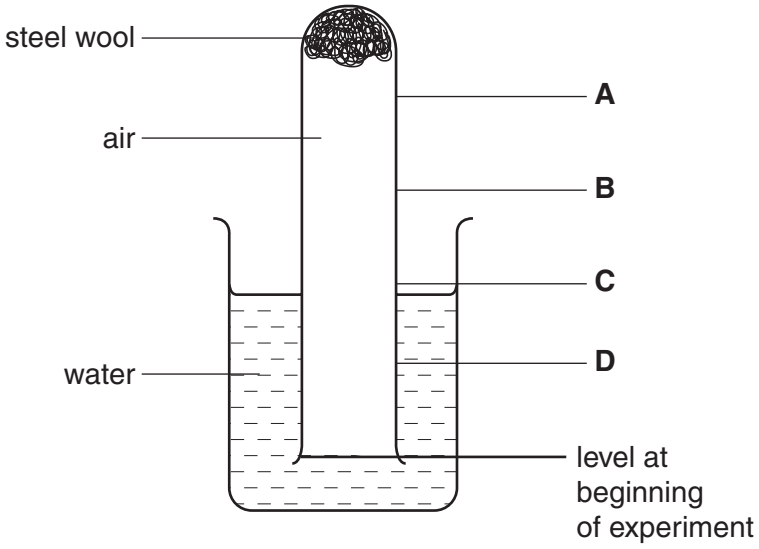
32 The metals iron, lead, magnesium and zinc are each added to dilute hydrochloric acid.

Which tube contains magnesium and dilute hydrochloric acid?



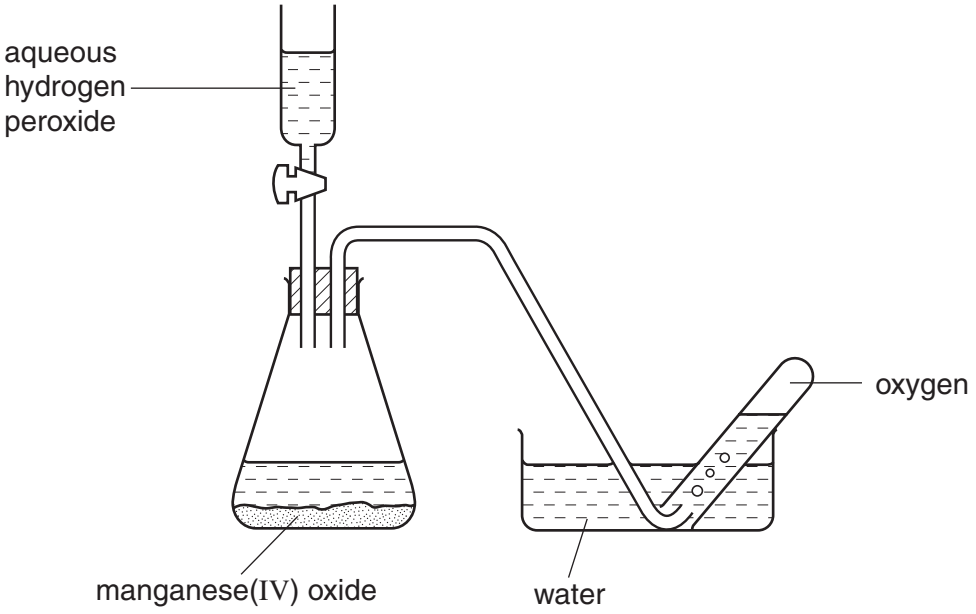
33 The diagram shows steel wool inside a test-tube. The test-tube is inverted in water, trapping air inside.

What will be the water level after several days?



34 Using manganese(IV) oxide as a catalyst, aqueous hydrogen peroxide decomposes to form oxygen.

This reaction was used to make and collect oxygen as shown in the diagram.



The first few test-tubes of collected gas should be rejected because the oxygen would be contaminated by

A air.

B hydrogen.

C hydrogen peroxide.

D manganese(IV) oxide.

35 A sample of polluted air is bubbled through water.

The pH of the solution formed is less than 7.

Which gas causes this?

A ammonia

B carbon monoxide

C nitrogen

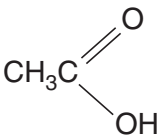
D sulphur dioxide

36 When crude oil is distilled, several products are obtained.

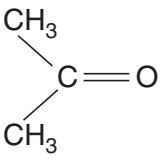
What is the correct order of their boiling points?

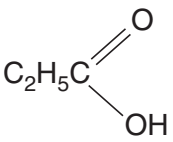
	lowest boiling point → highest boiling point			
A	diesel	paraffin	petrol	lubricating oil
B	paraffin	petrol	lubricating oil	diesel
C	petrol	paraffin	diesel	lubricating oil
D	petrol	diesel	lubricating oil	paraffin

37 Wine can deteriorate after a period of time, because of atmospheric oxidation.
Which compound would be formed by the oxidation of the alcohol in the wine?

A 

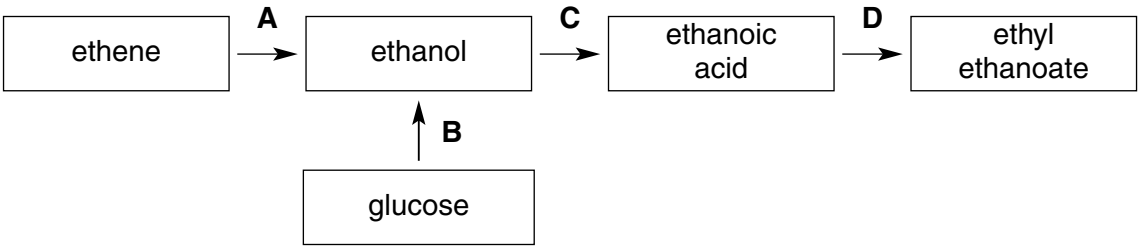
B CH_3CH_2OH

C 

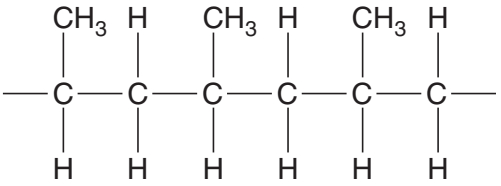
D 

38 The diagram shows changes to some organic compounds.

In which change is an ester formed?

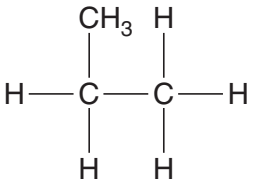


39 The structure of a polymer is shown

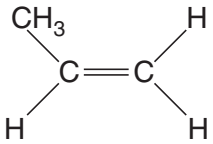


From which hydrocarbon is the polymer made?

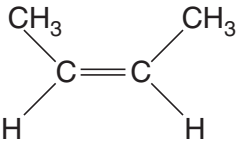
A



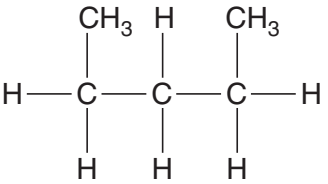
B



C



D



40 In which pair of polymers are the linkages the same?

A fats and proteins

B nylon and fats

C nylon and proteins

D proteins and *Terylene*

DATA SHEET
The Periodic Table of the Elements

Group																	
I	II											III	IV	V	VI	VII	0
							1 H Hydrogen 1										4 He Helium 2
7 Li Lithium 3	9 Be Beryllium 4											11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
23 Na Sodium 11	24 Mg Magnesium 12											27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulphur 16	35.5 Cl Chlorine 17	40 Ar Argon 18
39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54
133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57 *	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	Po Polonium 84	At Astatine 85	Rn Radon 86
Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89 †															

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
232 Th Thorium 90	Pa Protactinium 91	238 U Uranium 92	Np Neptunium 93	Pu Plutonium 94	Am Americium 95	Cm Curium 96	Bk Berkelium 97	Cf Californium 98	Es Einsteinium 99	Fm Fermium 100	Md Mendelevium 101	No Nobelium 102	Lr Lawrencium 103

*58-71 Lanthanoid series
†90-103 Actinoid series

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

The volume of one mole of any gas is 24 dm^3 at room temperature and pressure (r.t.p.).