UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CHEMISTRY **0620/12**

Paper 1 Multiple Choice **May/June 2012**

45 Minutes

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

7216958504

READ THESE INSTRUCTIONS FIRST

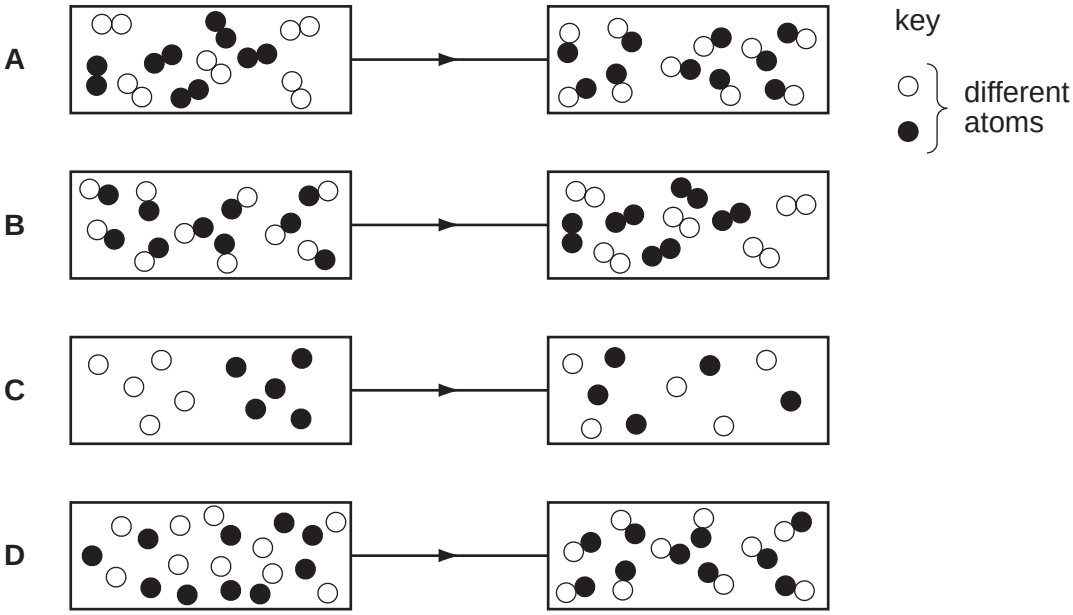
Write in soft pencil.
Do not use staples, paper clips, highlighters, glue or correction fluid.
Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.

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 16.
You may use a calculator.

1 Which diagram shows the process of diffusion?



2 Which method would be most suitable for the separation of a mixture of sand and water to obtain the sand?

A chromatography

B crystallisation

C distillation

D filtration

3 A student investigates how the concentration of an acid affects the speed of reaction with a 0.5 g mass of magnesium at 30 °C.

The student has a beaker, concentrated acid, water and the apparatus below.

P a balance

Q a clock

R a measuring cylinder

S a thermometer

Which pieces of apparatus does the student use?

A P, Q and R only

B P, Q and S only

C Q, R and S only

D P, Q, R and S

4 An element Y has the proton number 18.

The next element in the Periodic Table is an element Z.

Which statement is correct?

A Element Z has one more electron in its outer shell than element Y.

B Element Z has one more electron shell than element Y.

C Element Z is in the same group of the Periodic Table as element Y.

D Element Z is in the same period of the Periodic Table as element Y.

5 Which atom has twice as many neutrons as protons?

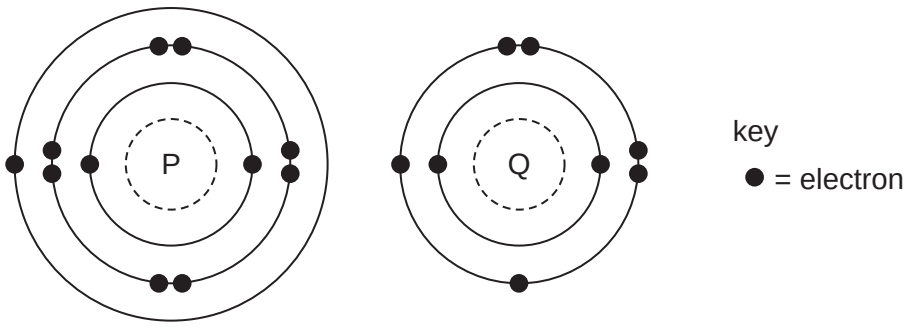
A $^{1}_{1}H$ **B** $^{2}_{1}H$ **C** $^{3}_{1}H$ **D** $^{4}_{2}He$

6 The table contains information about four substances.

Which substance is potassium chloride?

	melting point /°C	conduction of electricity	
		when molten	in aqueous solution
A	11	no	yes
B	98	yes	yes
C	772	yes	yes
D	1410	no	insoluble

7 The electronic structures of atoms P and Q are shown.



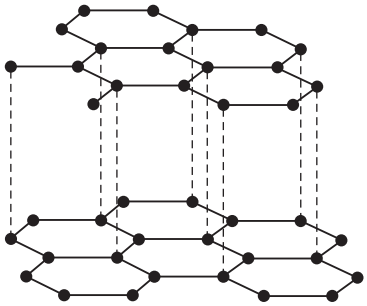
P and Q react to form an ionic compound.

What is the formula of this compound?

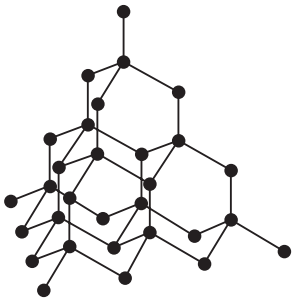
A PQ_2 **B** P_2Q **C** P_2Q_6 **D** P_6Q_2

8 The diagrams show the structures of two forms, P and Q, of a solid element.

P



Q



What are suitable uses of P and Q, based on their structures?

	use of solid P	use of solid Q
A	drilling	drilling
B	lubricating	drilling
C	drilling	lubricating
D	lubricating	lubricating

9 Methane, CH_4, burns in the air to form carbon dioxide and water.

What is the balanced equation for this reaction?

A $CH_4(g) + O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$

B $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$

C $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + H_2O(g)$

D $CH_4(g) + 3O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$

10 In which reaction is lead(II) oxide, PbO, oxidised?

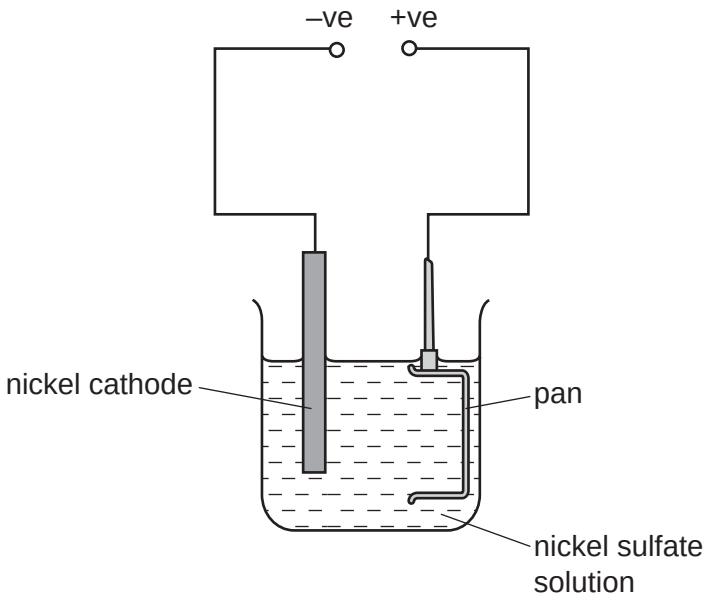
A $PbO + C \rightarrow Pb + CO$

B $PbO + CO \rightarrow Pb + CO_2$

C $PbO + H_2 \rightarrow Pb + H_2O$

D $2PbO + O_2 \rightarrow 2PbO_2$

11 The diagram shows an unsuccessful experiment to nickel plate a pan.



Which change is necessary to plate the pan with nickel?

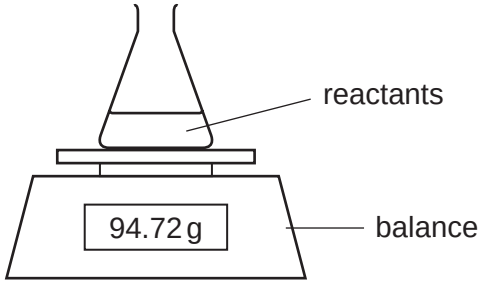
A Add more nickel sulfate to the solution.

B Heat the solution to 100 °C.

C Increase the current in the circuit.

D Make the pan the negative electrode.

12 The rates of some chemical reactions can be measured by using the apparatus shown.



For which reaction is this apparatus suitable?

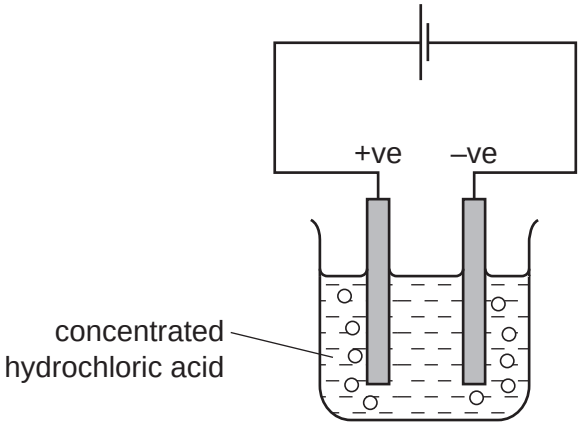
A $MgCO_3 + 2HCl \rightarrow MgCl_2 + CO_2 + H_2O$

B $Mg + ZnCl_2 \rightarrow MgCl_2 + Zn$

C $MgCl_2 + 2NaOH \rightarrow Mg(OH)_2 + 2NaCl$

D $MgO + 2HCl \rightarrow MgCl_2 + H_2O$

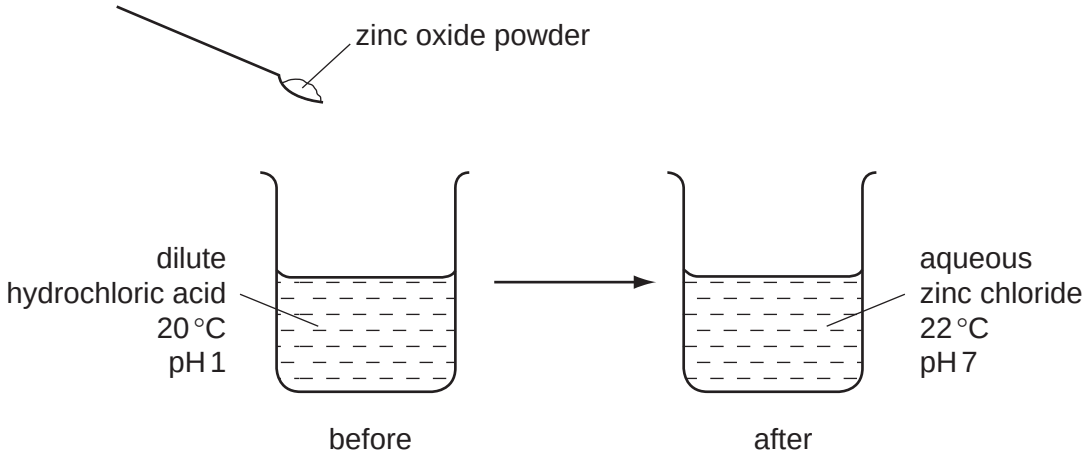
13 The diagram shows that two gases are formed when concentrated hydrochloric acid is electrolysed using inert electrodes.



Which row correctly describes the colours of the gases at the electrodes?

	anode (+ve)	cathode (–ve)
A	colourless	colourless
B	colourless	yellow-green
C	yellow-green	colourless
D	yellow-green	yellow-green

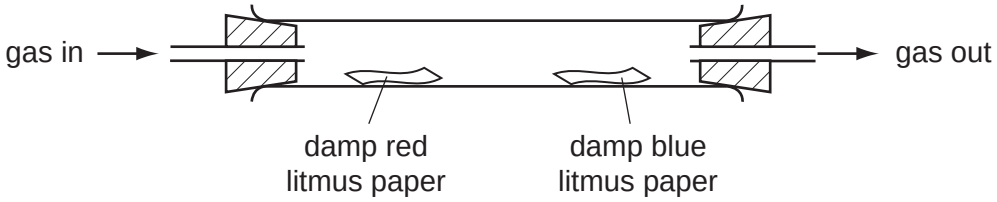
14 The diagram shows the reaction between zinc oxide and dilute hydrochloric acid.



Which terms describe the reaction?

	endothermic	neutralisation
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

15 Four different gases are passed through the apparatus shown.



Which gas has no effect on either piece of litmus paper?

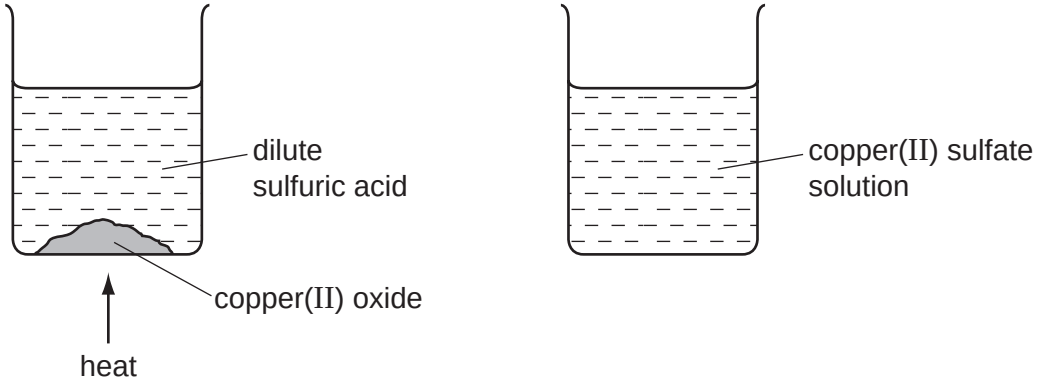
A ammonia

B carbon dioxide

C chlorine

D hydrogen

16 An aqueous solution of copper(II) sulfate was made by adding excess copper(II) oxide to dilute sulfuric acid. The mixture was heated, stirred and then filtered.



What was the pH of the acid before adding the copper(II) oxide and of the solution after filtration?

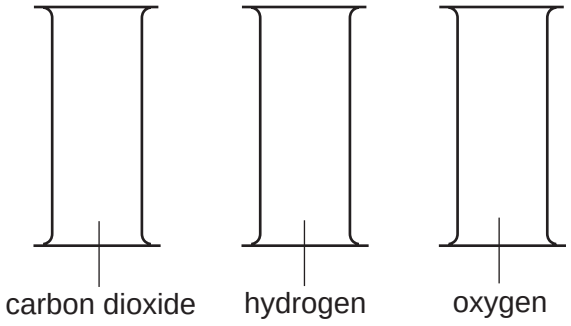
	pH of acid before adding copper(II) oxide	pH of solution after filtration
A	greater than 7	7
B	greater than 7	less than 7
C	less than 7	7
D	less than 7	greater than 7

17 Aqueous potassium iodide is added to aqueous silver nitrate.

What are the colours of the final precipitate and solution?

	precipitate	solution
A	brown	colourless
B	white	yellow
C	yellow	colourless
D	yellow	white

18 Three gas jars contain carbon dioxide, hydrogen and oxygen, as shown.



Which one of the following tests could be used to discover which gas is in each jar?

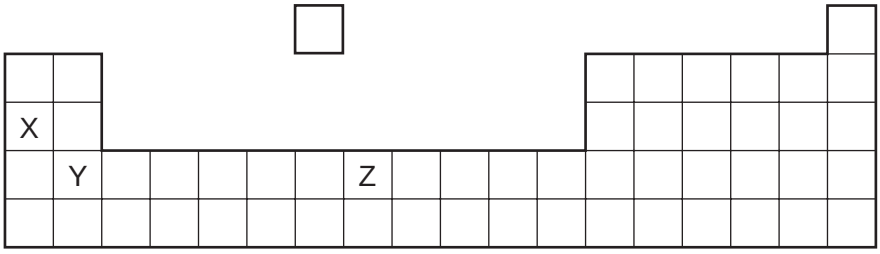
A a glowing splint

B a lighted splint

C damp blue litmus paper

D limewater

19 The diagram shows an outline of part of the Periodic Table.



Which statement about elements X, Y and Z is **not** correct?

A All are metals.

B All conduct electricity.

C All form coloured compounds.

D All react with oxygen.

20 Elements X, Y and Z are in Group VII of the Periodic Table.

X is a gas.

Y is less reactive than Z

Z is a red liquid.

When X, Y and Z are put in order of increasing proton number, which order is correct?

A $X \rightarrow Y \rightarrow Z$ **B** $X \rightarrow Z \rightarrow Y$ **C** $Y \rightarrow X \rightarrow Z$ **D** $Y \rightarrow Z \rightarrow X$

21 Which properties of the element titanium, Ti, can be predicted from its position in the Periodic Table?

	can be used as a catalyst	conducts electricity when solid	has low density	forms coloured compounds
A	✓	✓	✗	✓
B	✓	✓	✓	✗
C	✓	✗	✓	✓
D	✗	✓	✓	✓

22 Five elements have proton numbers 10, 12, 14, 16 and 18.

What are the proton numbers of the three elements that form oxides?

A 10, 12 and 14

B 10, 14 and 18

C 12, 14 and 16

D 14, 16 and 18

23 Which statement about aluminium is **not** correct?

A It is resistant to corrosion.

B It is strong and has a high density.

C It is used in food containers.

D It is used in the manufacture of aircraft.

24 Many metals are extracted from their ores by heating the metal oxide with carbon.

Which metal **cannot** be extracted using this method?

A aluminium

B copper

C iron

D zinc

25 A metal has the following properties.

- It does not react with cold water.
- It reacts with dilute hydrochloric acid.
- It cannot be extracted from its oxide using carbon.

Between which two metals in the reactivity series should it be placed?

A calcium and magnesium

B iron and copper

C magnesium and zinc

D zinc and iron

26 Which statements about the general properties of metals are correct?

1 conduct electricity when solid

2 form acidic oxides

3 high melting point

A 1 and 3 **B** 1 only **C** 2 and 3 **D** 2 only

27 Water for human use is treated by filtration then chlorination.

Which uses do **not** need water of this quality?

1 water for cooling in industry

2 water for flushing toilets in the home

3 water for drinking

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

28 Carbon monoxide is an air pollutant produced when petrol is burned in a car engine.

Why is carbon monoxide considered to be an air pollutant?

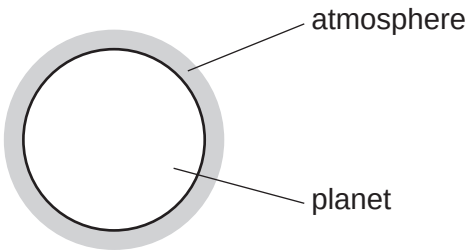
A It causes global warming.

B It causes the corrosion of buildings.

C It is a greenhouse gas.

D It is poisonous.

29 A new planet has been discovered and its atmosphere has been analysed.



The table shows the composition of the atmosphere.

gas	percentage by volume
carbon dioxide	4
nitrogen	72
oxygen	24

Which gases are present in the atmosphere of the planet in a higher percentage than they are in the Earth's atmosphere?

A carbon dioxide and oxygen

B carbon dioxide only

C nitrogen and oxygen

D nitrogen only

30 Acetylene, C_2H_2, is a hydrocarbon. When acetylene and oxygen react, the hot flame produced can be used to weld steel.

Which statement is correct?

A Acetylene and oxygen react exothermically.

B Acetylene is saturated.

C Oxygen and steel react endothermically.

D Oxygen is a gaseous fuel.

31 Fertilisers are used to provide three elements needed to increase the yield of crops.

Which two compounds, when used together, would provide all three of these elements?

A ammonium nitrate and calcium phosphate

B ammonium nitrate and potassium sulfate

C potassium nitrate and calcium phosphate

D potassium nitrate and potassium sulfate

32 Carbon dioxide and methane are 'greenhouse gases' which contribute to global warming.

Which process does **not** increase global warming?

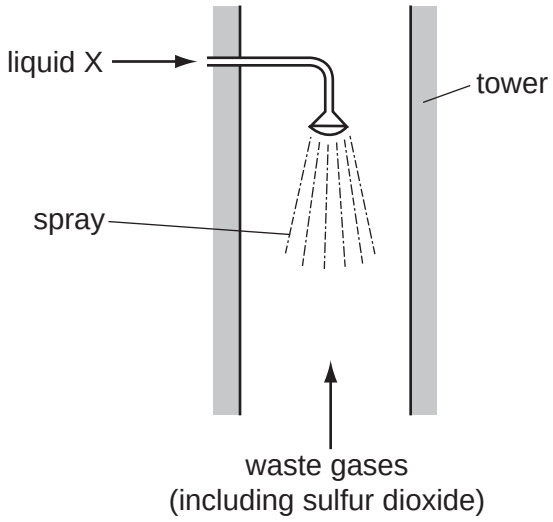
A burning fossil fuels

B decay of organic waste

C farming cattle for beef

D growing crops such as sugar cane

33 When coal and oil burn in power stations, the acidic gas sulfur dioxide is formed. Sulfur dioxide is removed by absorbing it in a liquid sprayed down a tower.



What is liquid X?

A calcium hydroxide solution

B sodium chloride solution

C dilute hydrochloric acid

D water

34 The table shows bonds that are present and bonds that are not present in compound X.

bond	
C–C	✓
C=C	✗
C–H	✓
C–O	✓
C=O	✓
O–H	✓

What type of compound is X?

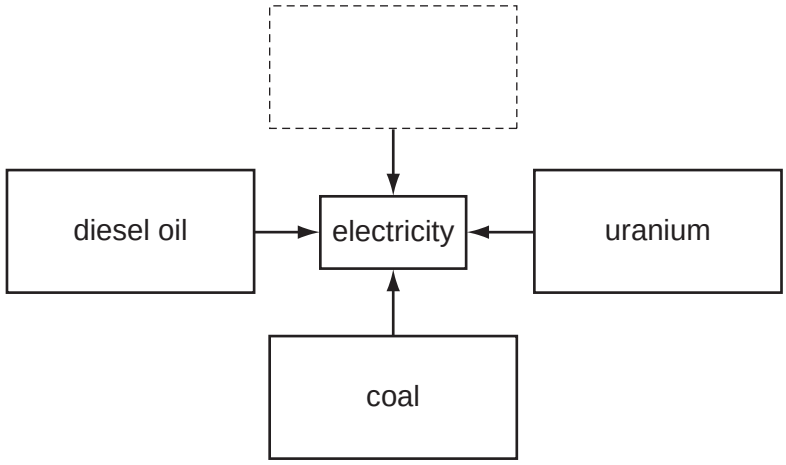
A a carboxylic acid

B an alcohol

C an alkane

D an alkene

35 The diagram shows different fuels from which electricity can be generated.



Which box completes the diagram?

A

ammonia

B

bitumen

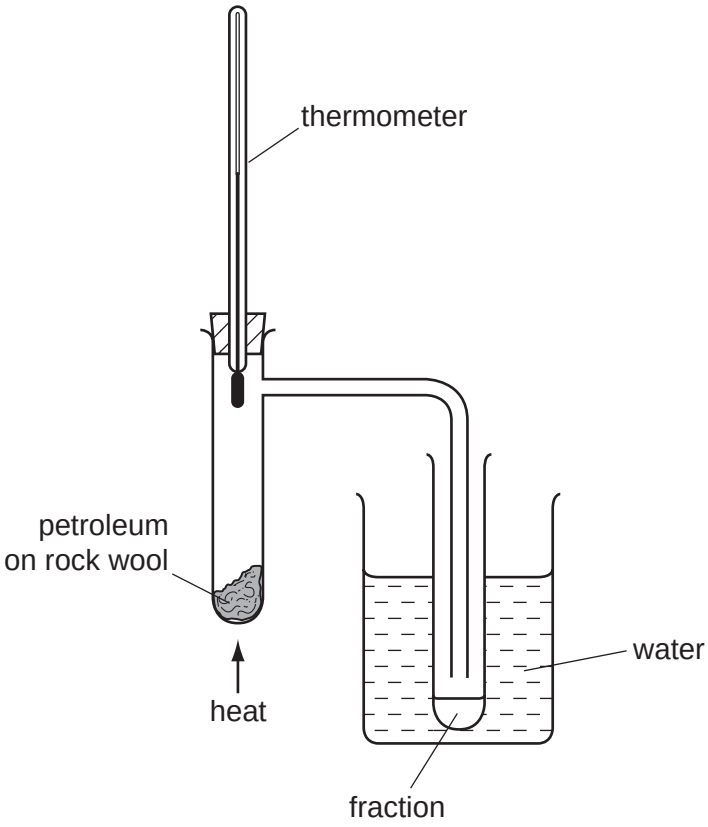
C

natural gas

D

steam

36 The diagram shows apparatus used to separate petroleum into four fractions.



Which fraction contains the smallest hydrocarbon molecules?

fraction	boiling point range / °C
A	up to 70
B	70 to 120
C	120 to 170
D	over 170

37 Ethanol is a fuel used in cars. It can be made from petroleum.

$C_4H_{10} \rightarrow C_2H_4 + C_2H_6$ cracking

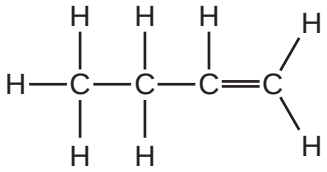
$C_2H_4 + H_2O \rightarrow C_2H_5OH$ producing ethanol

$C_2H_5OH + 3O_2 \rightarrow 2CO_2 + 3H_2O$ burning

Compounds of how many homologous series appear in these equations?

A 1 **B** 2 **C** 3 **D** 4

38 Butene is an alkene which is manufactured by cracking hydrocarbons.



Which hydrocarbon can be cracked to make butene?

A ethane, C_2H_6

B decane, $C_{10}H_{22}$

C methane, CH_4

D propane, C_3H_8

39 Which substance does **not** produce carbon dioxide when it burns in oxygen?

A butane

B ethanol

C ethene

D hydrogen

40 Ethanol is an important chemical produced by the ……1…… of ……2…… .

Which words correctly complete gaps 1 and 2?

	1	2
A	combustion	ethane
B	combustion	glucose
C	fermentation	ethane
D	fermentation	glucose

DATA SHEET
The Periodic Table of the Elements

Group																		
I	II										III	IV	V	VI	VII	0
																4 **He** Helium 2
					1 **H** Hydrogen 1											
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** Sulfur 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
X
b

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.).