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.

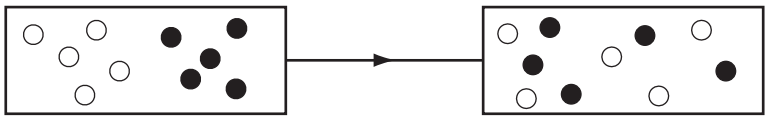
This document consists of **16** printed pages.

1 Which diagram shows the process of diffusion?

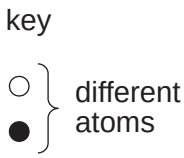
A

B

C



D



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?

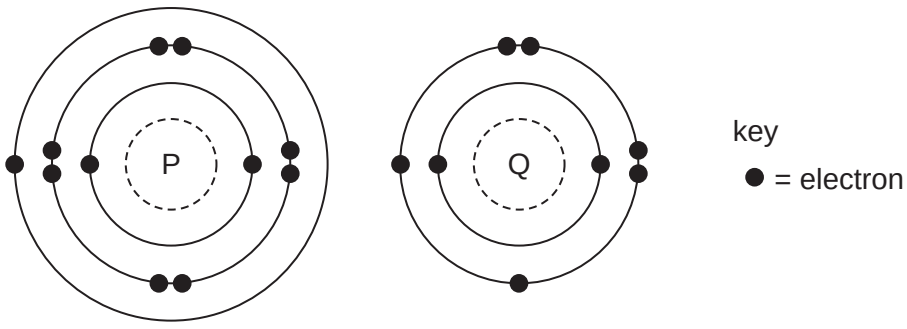
A $^{1}_{1}H$ **B** $^{2}_{1}H$ **C** $^{3}_{1}H$ **D** $^{4}_{2}He$

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.



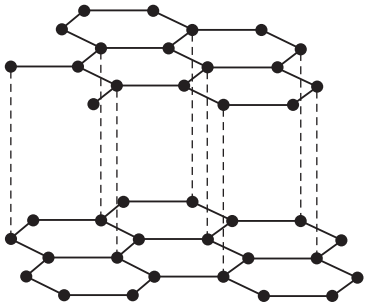
P and Q react to form an ionic compound.

What is the formula of this compound?

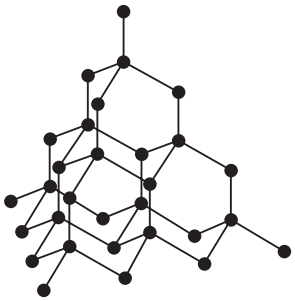
A PQ_2 **B** P_2Q **C** P_2Q_6 **D** P_6Q_2

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?

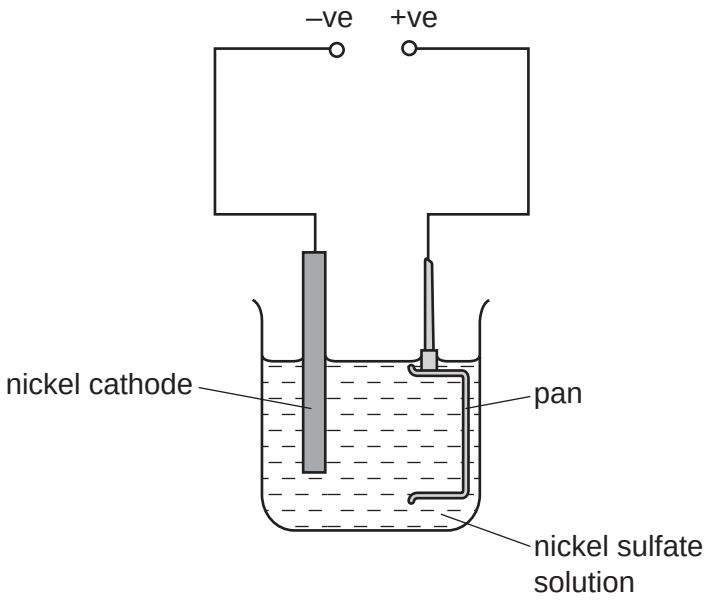
A $PbO + C \rightarrow Pb + CO$

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?

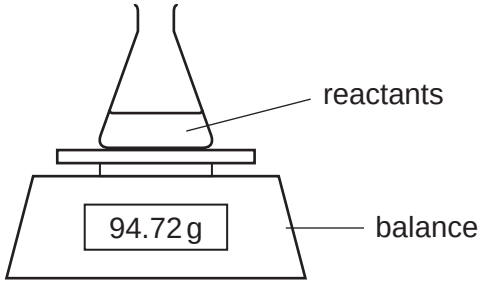
A Add more nickel sulfate to the solution.

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?

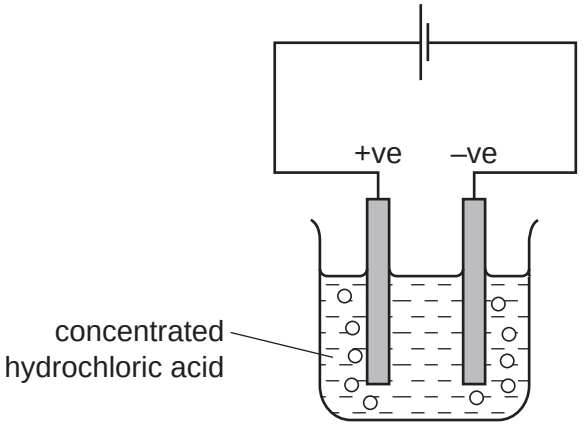
A $MgCO_3 + 2HCl \rightarrow MgCl_2 + CO_2 + H_2O$

B $Mg + ZnCl_2 \rightarrow MgCl_2 + Zn$

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

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

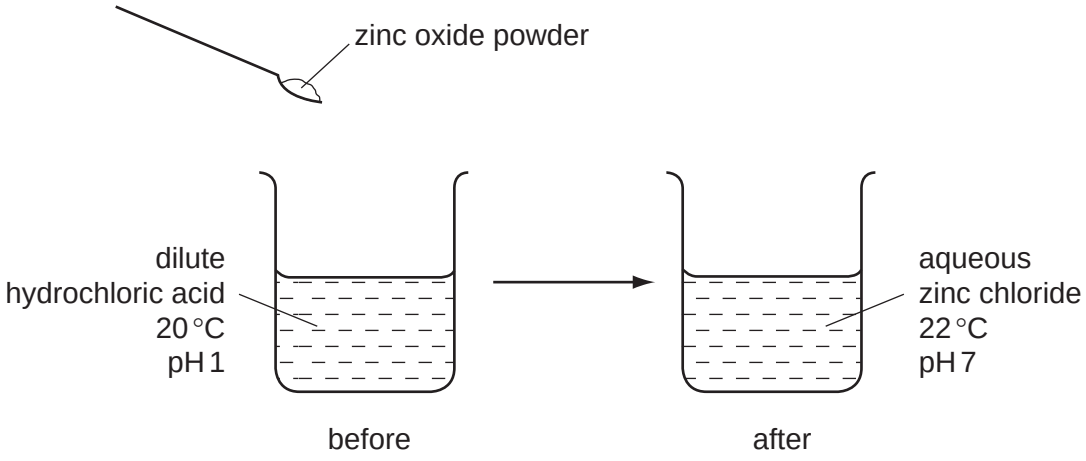
13 The diagram shows that two gases are formed when concentrated hydrochloric acid is electrolysed using inert electrodes.



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

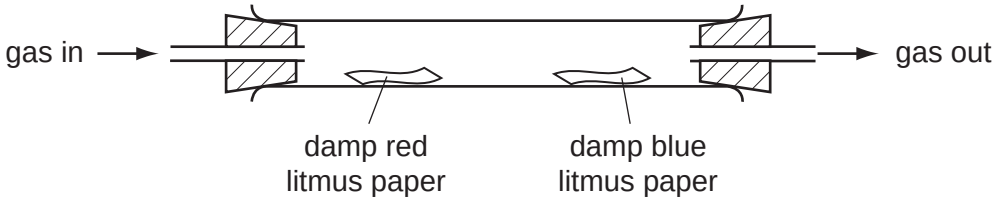
14 The diagram shows the reaction between zinc oxide and dilute hydrochloric acid.



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?

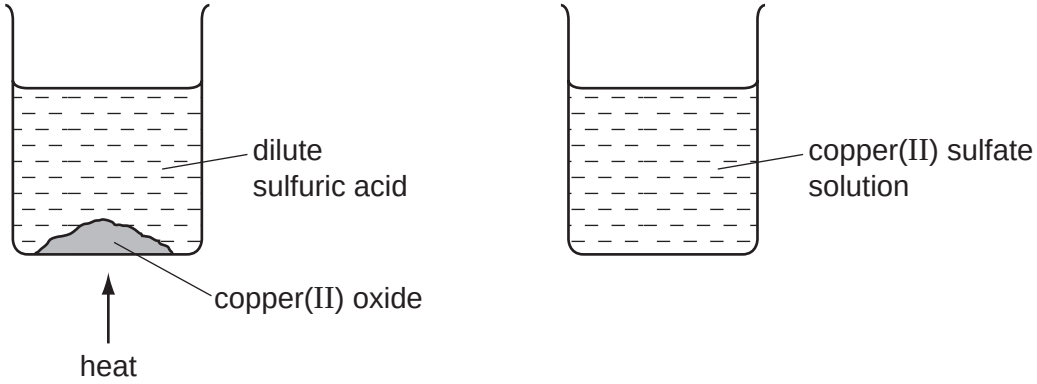
A ammonia

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?

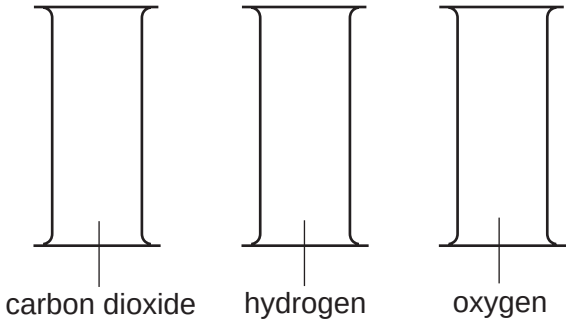
	pH of acid before adding copper(II) oxide	pH of solution after filtration
A	greater than 7	7
B	greater than 7	less than 7
C	less than 7	7
D	less than 7	greater than 7

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?

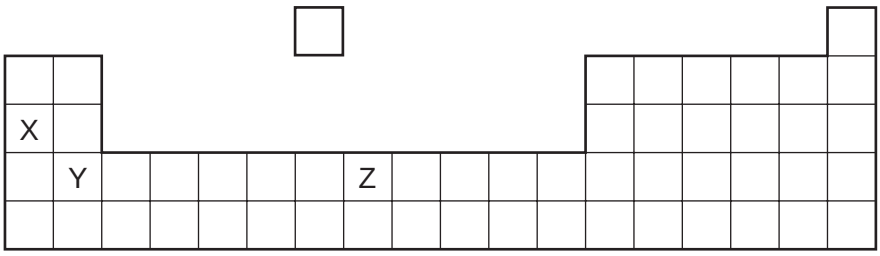
A a glowing splint

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?

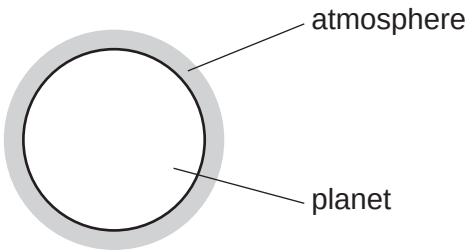
A It causes global warming.

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?

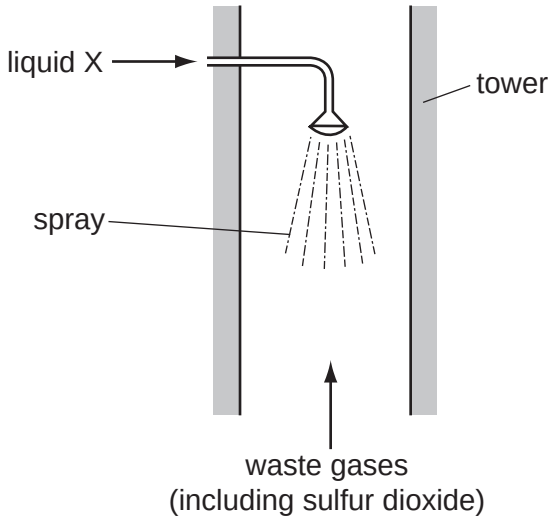
A burning fossil fuels

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?

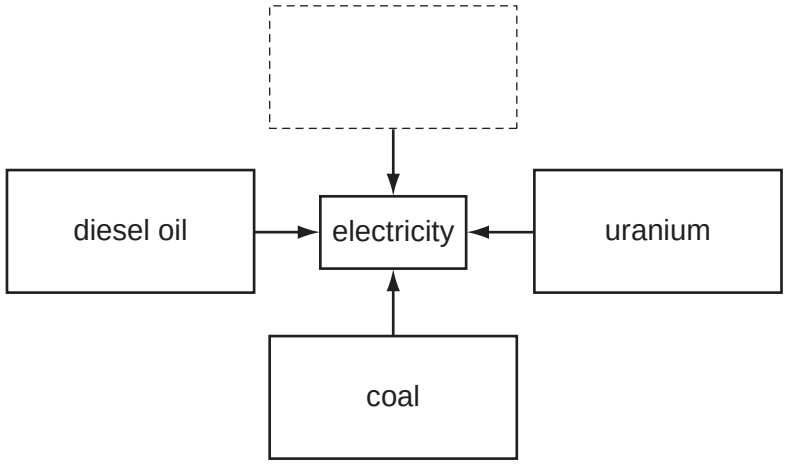
A a carboxylic acid

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

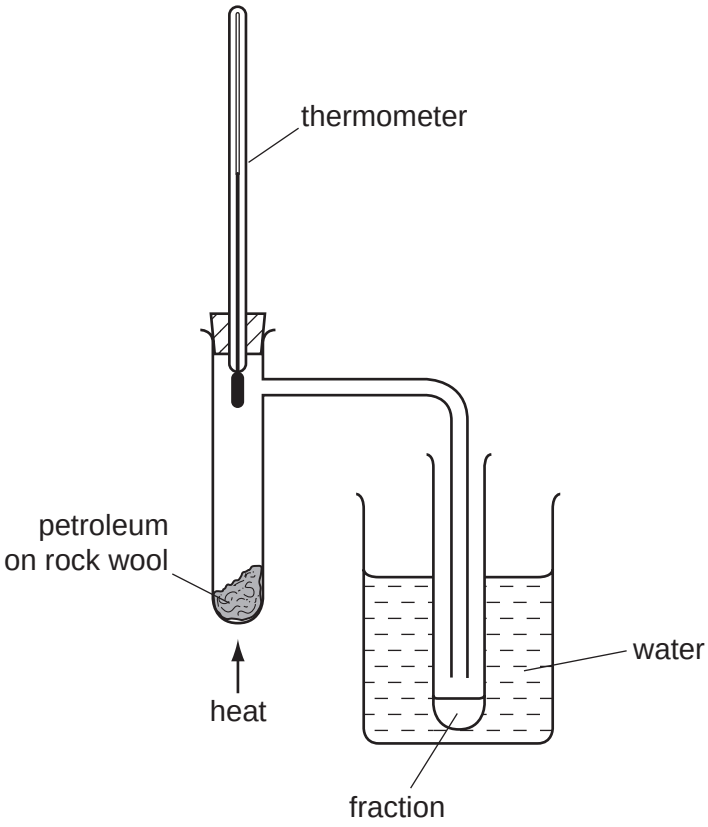
C

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

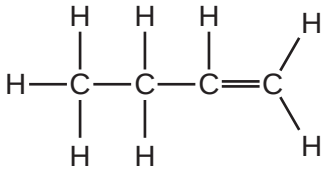
$C_2H_4 + H_2O \rightarrow C_2H_5OH$ producing ethanol

$C_2H_5OH + 3O_2 \rightarrow 2CO_2 + 3H_2O$ 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						11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10		
7 Li Lithium 3	9 Be Beryllium 4									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		
23 Na Sodium 11	24 Mg Magnesium 12									70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36		
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	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54
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	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	Po Polonium 84	At Astatine 85	Rn Radon 86
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						
	226 Ra Radium 88	227 Ac Actinium †															

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.).