Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CHEMISTRY **0620/12**

Paper 1 Multiple Choice **May/June 2014**

45 Minutes

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

* 3 5 4 2 4 5 6 4 2 6 *

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, 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.
DO **NOT** WRITE IN ANY BARCODES.

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.
Electronic calculators may be used.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level1/Level 2 Certificate.

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

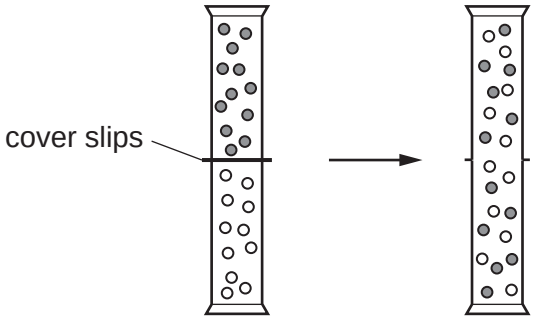
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1 Two gas jars each contain a different gas. The gas jars are connected and the cover slips are removed.

The diagram shows what happens to the particles of the gases.



Which process has occurred?

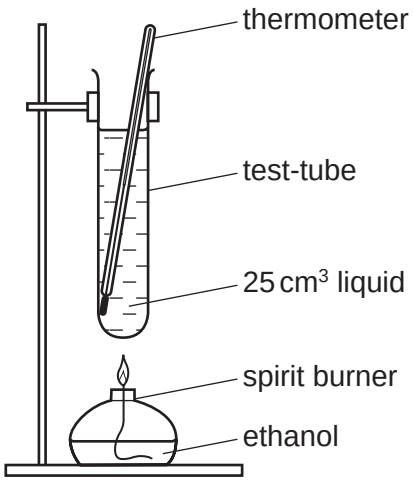
A chemical reaction

B condensation

C diffusion

D evaporation

2 A liquid is heated until it boils.



Which result shows that the liquid in the test-tube is pure water?

A Condensation forms at the top of the test-tube.

B Steam is produced.

C The thermometer reads 100 °C.

D There is nothing left behind in the test-tube.

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3 Which two methods can be used to separate a salt from its solution in water?

1 crystallisation

2 decanting

3 distillation

4 filtration

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

4 Which statements about a phosphorus atom, $^{31}_{15}P$, are correct?

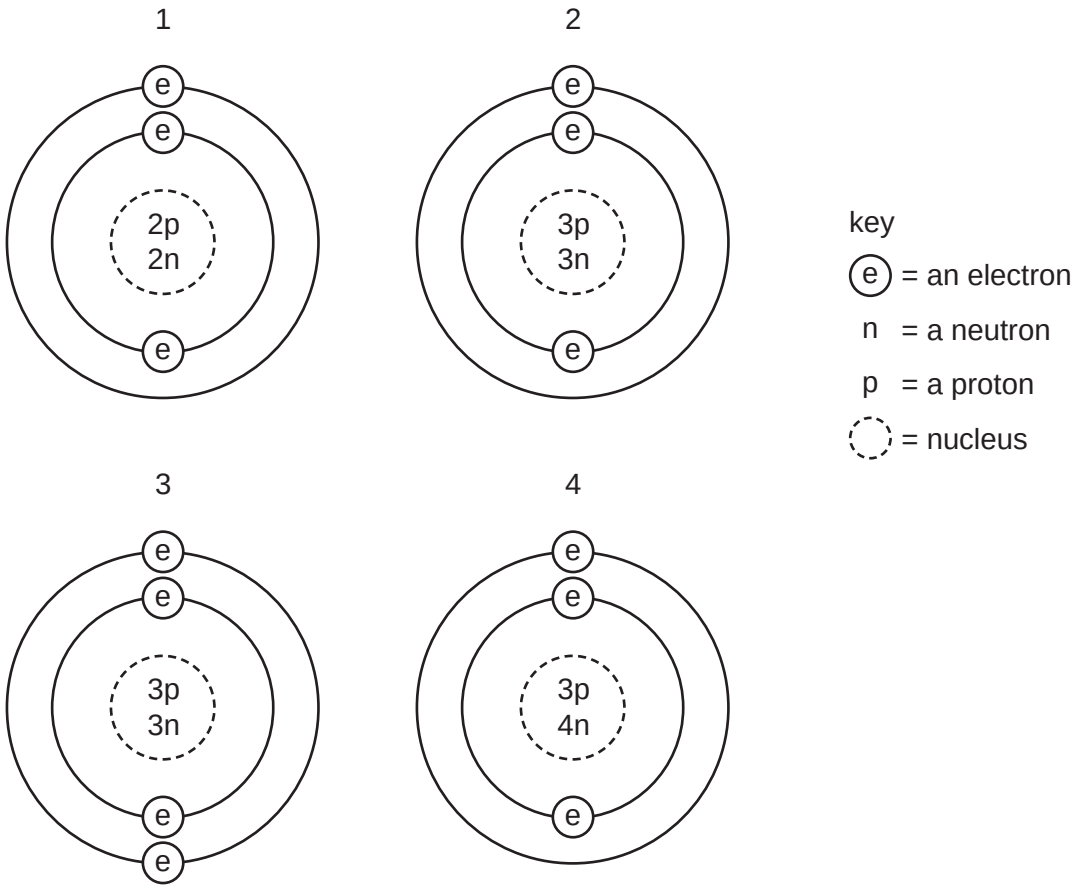
1 The nucleon number is 16.

2 The number of outer electrons is 5.

3 The proton number is 15.

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

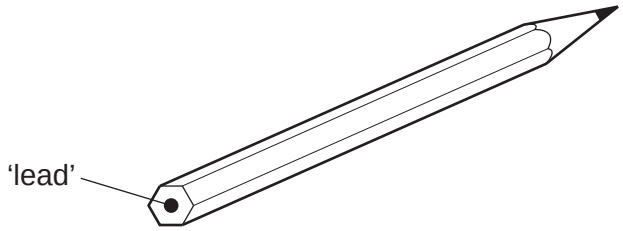
5 The diagrams show four particles.



Which two diagrams show **atoms** that are isotopes of each other?

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

6 The 'lead' in a pencil is made of a mixture of graphite and clay.



When the percentage of graphite is increased, the pencil slides across the paper more easily.

Which statement explains this observation?

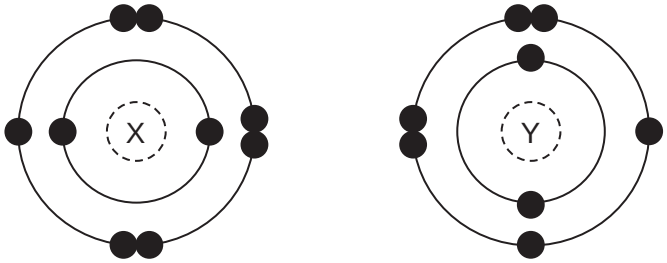
A Graphite has a high melting point.

B Graphite is a form of carbon.

C Graphite is a lubricant.

D Graphite is a non-metal.

7 The electronic structures of two atoms, X and Y, are shown.



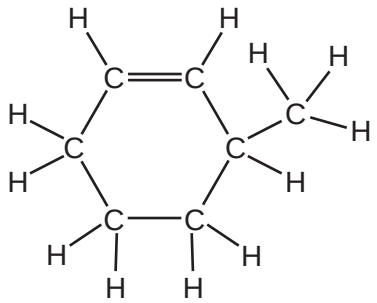
X and Y combine together to form a compound.

What is the type of bonding in the compound and what is the formula of the compound?

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

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8 The structure of an organic compound, X, is shown.



What is the molecular formula of X?

A C_6H_9 **B** C_6H_{12} **C** C_7H_{12} **D** C_7H_{14}

9 What is the relative molecular mass, M_r, of nitrogen dioxide?

A 15 **B** 23 **C** 30 **D** 46

10 Electrical cables are made from either ……1……, because it is a very good conductor of electricity, or from……2……, because it has a low density.
Overhead cables have a ……3…… core in order to give the cable strength.

Which words correctly complete gaps 1, 2 and 3?

	1	2	3
A	aluminium	copper	magnesium
B	copper	aluminium	magnesium
C	copper	aluminium	steel
D	magnesium	copper	steel

11 What will be produced at the anode and at the cathode, if molten potassium chloride is electrolysed?

	anode (+)	cathode (-)
A	chlorine	hydrogen
B	chlorine	potassium
C	hydrogen	chlorine
D	potassium	chlorine

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12 Solutions of two chemicals are mixed.

A reaction occurs and the temperature change is measured.

Which statement is correct?

A If the reaction is endothermic, the temperature decreases and energy is taken in.

B If the reaction is endothermic, the temperature increases and energy is given out.

C If the reaction is exothermic, the temperature decreases and energy is given out.

D If the reaction is exothermic, the temperature increases and energy is taken in.

13 Power stations produce electrical energy from different fuels.

Which fuel causes least pollution to the atmosphere?

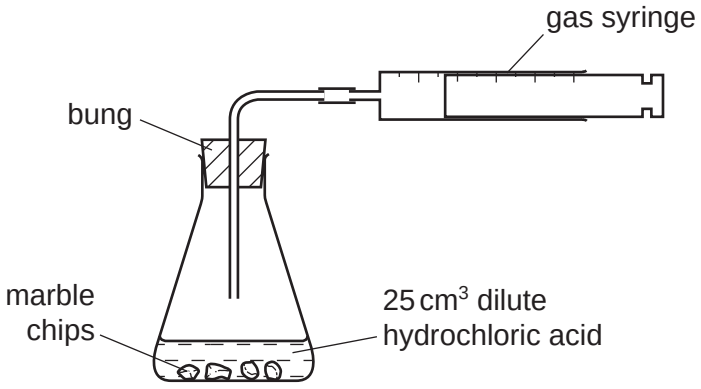
A coal

B fuel oil

C natural gas

D radioactive isotopes

14 A student was investigating the reaction between marble chips and dilute hydrochloric acid.



Which changes would reduce the rate of reaction?

	temperature of acid	concentration of acid	surface area of marble chips
A	decrease	decrease	decrease
B	decrease	decrease	increase
C	increase	decrease	decrease
D	increase	increase	increase

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15 Which equation shows an oxidation reaction?

A $C + O_2 \rightarrow CO_2$

B $CaCO_3 \rightarrow CaO + CO_2$

C $CaO + 2HCl \rightarrow CaCl_2 + H_2O$

D $N_2O_4 \rightarrow 2NO_2$

16 In separate experiments, a catalyst is added to a reaction mixture and the temperature of the mixture is decreased.

What are the effects of these changes on the rate of the reaction?

	catalyst added	temperature decreased
A	faster	faster
B	faster	slower
C	slower	faster
D	slower	slower

17 Different plants grow best under different pH conditions.

Which plant grows best in alkaline soil?

	plant	grows best in soil at pH
A	cabbage	6-8
B	potato	4-7
C	strawberry	5-7
D	wheat	6-7

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18 The equation shows a reaction that is reversed by changing the conditions.

$$CuSO_4.5H_2O \xrightarrow{\text{forward reaction}} CuSO_4 + 5H_2O$$

How can the forward reaction be reversed?

	by adding water	by heating
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

19 Element X forms an oxide, XO, that neutralises sulfuric acid.

Which row describes X and XO?

	element X	nature of oxide, XO
A	metal	acidic
B	metal	basic
C	non-metal	acidic
D	non-metal	basic

20 Copper carbonate reacts with dilute sulfuric acid to make copper sulfate.

$$CuCO_3(s) + H_2SO_4(aq) \rightarrow CuSO_4(aq) + CO_2(g) + H_2O(l)$$

Which row gives the correct order of steps for making copper sulfate crystals?

	step 1	step 2	step 3	step 4
A	add excess acid to the copper carbonate	filter	evaporate filtrate to point of crystallisation	leave to cool
B	add excess acid to the copper carbonate	filter	evaporate to dryness	leave to cool
C	add excess copper carbonate to the acid	evaporate to point of crystallisation	leave to cool	filter
D	add excess copper carbonate to the acid	filter	evaporate filtrate to point of crystallisation	leave to cool

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21 Element X is a non-metal.

In which position of the Periodic Table could element X be found?

A at the bottom of Group I

B at the top of Group 0

C at the top of Group I

D in the transition elements

22 Aqueous sodium hydroxide is added to solid X and the mixture is heated.

A green precipitate is formed and an alkaline gas is given off.

Which ions are present in X?

A NH_4^+ and Fe^{2+}

B NH_4^+ and Fe^{3+}

C OH^- and Fe^{2+}

D OH^- and Fe^{3+}

23 A student carried out an experiment to find the order of reactivity of five metals.
They were tested with cold water, hot water and steam and the results recorded in a table.

metal	cold water	hot water	steam
V	no reaction	reacts slowly	vigorous reaction
W	no reaction	no reaction	slow reaction
X	reacts slowly	vigorous reaction	not attempted
Y	no reaction	no reaction	no reaction
Z	vigorous reaction	explosive reaction	not attempted

What is the order of reactivity of these metals?

	most reactive →				least reactive
A	V	W	Y	X	Z
B	W	X	Z	V	Y
C	Z	X	V	W	Y
D	Z	X	Y	W	V

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24 Why is argon gas used to fill electric lamps?

A It conducts electricity.

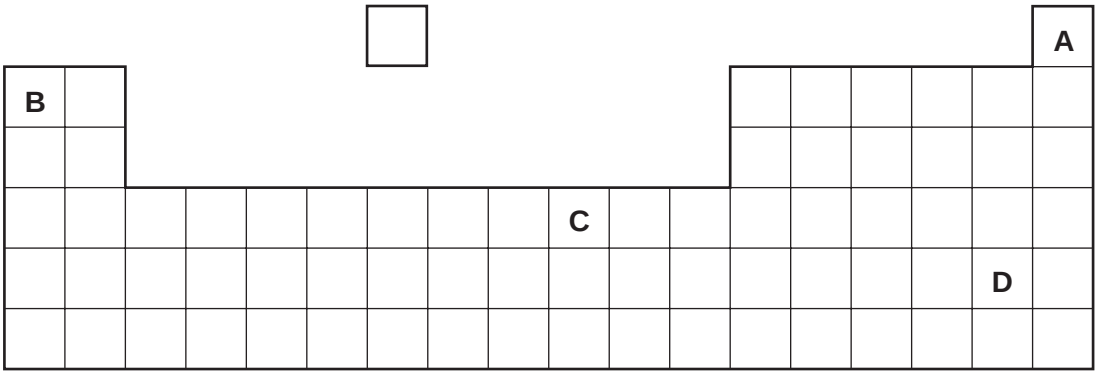
B It glows when heated.

C It is less dense than air.

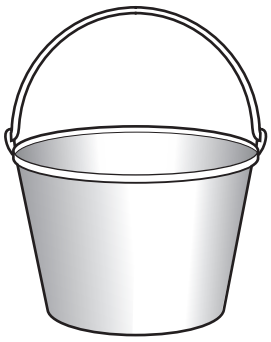
D It is not reactive.

25 An element melts at 1455 °C, has a density of 8.90 g / cm^3 and forms a green chloride.

Where in the Periodic Table is this element found?



26 The diagrams show two items that may be found in the home. Each item contains zinc.



zinc plated bucket



brass door-knocker

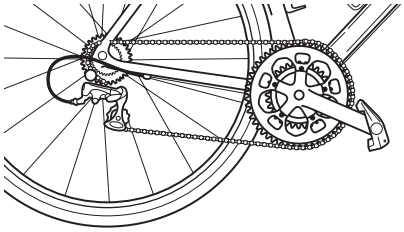
In which is zinc used as an alloy?

	bucket	door-knocker
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

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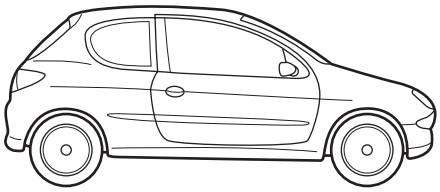
27 Which object is likely to be made from stainless steel?

A



bicycle chain

B



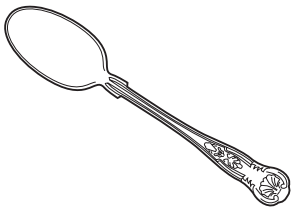
car body

C



can of beans

D



teaspoon

28 Four reactions that take place in the blast furnace to produce iron are shown.

Which reaction is used to keep the furnace hot?

A $C + O_2 \rightarrow CO_2$

B $CO_2 + C \rightarrow 2CO$

C $Fe_2O_3 + 3C \rightarrow 2Fe + 3CO$

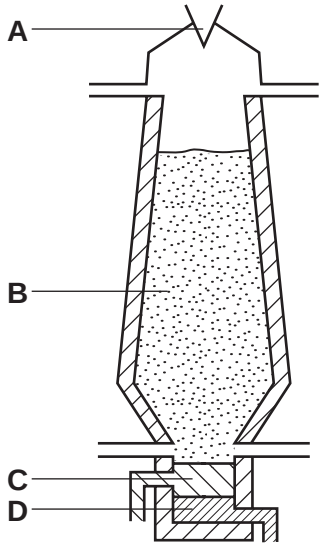
D $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

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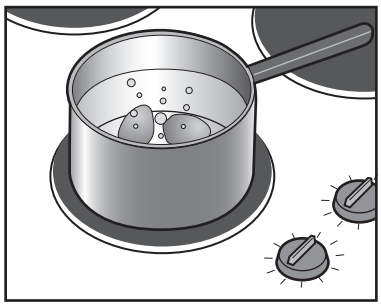
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29 The diagram shows a blast furnace.

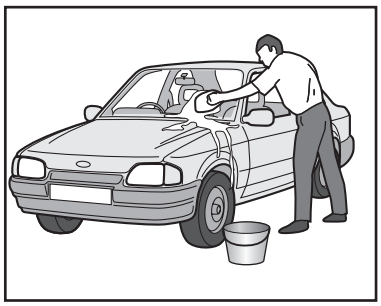
In which part is iron ore changed to iron?



30 The diagram shows some uses of water in the home.



1



2



3

For which uses is it important for the water to have been treated?

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

31 A piece of uncoated iron and three pieces of iron with various coatings were left exposed to the air.

Which piece of iron would rust?

A the painted piece

B the tin-coated piece

C the uncoated piece

D the zinc-coated piece

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32 Which compound would **not** be an effective fertiliser?

A ammonium nitrate, NH_4NO_3

B calcium oxide, CaO

C calcium phosphate, $Ca_3(PO_4)_2$

D potassium nitrate, KNO_3

33 Sulfur dioxide, SO_2, nitrogen dioxide, NO_2, and carbon monoxide, CO, are air pollutants.

Which row correctly shows their major source?

	motor car engines	power stations
A	CO	NO_2, SO_2
B	NO_2, CO	SO_2
C	SO_2, NO_2	CO
D	SO_2	NO_2, CO

34 Which process does **not** produce carbon dioxide?

A combustion of methane

B fermentation of sugar

C polymerisation of ethene

D respiration

35 Which pollutant gas is produced by the decomposition of vegetation?

A carbon monoxide

B methane

C nitrogen oxide

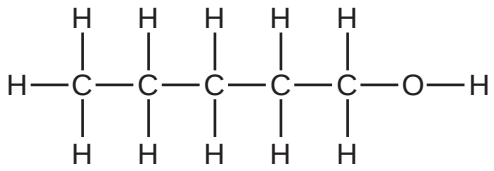
D sulfur dioxide

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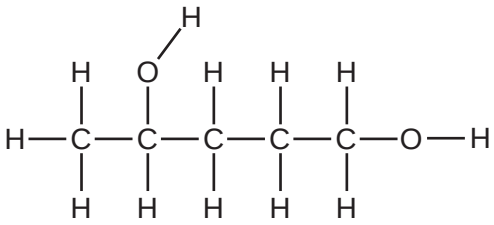
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36 Which diagram shows the structure of pentanoic acid?

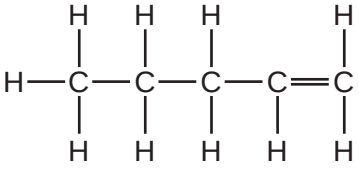
A



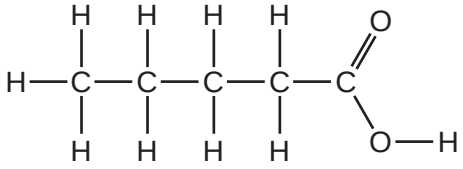
B



C



D



37 The table shows the composition of four different types of petroleum (crude oil).

fraction	Arabian Heavy /%	Arabian Light /%	Iranian Heavy /%	North Sea /%
gasoline	18	21	21	23
kerosene	11.5	13	13	15
diesel oil	18	20	20	24
fuel oil	52.5	46	46	38

Which type of petroleum is best for the motor vehicle industry?

A Arabian Heavy

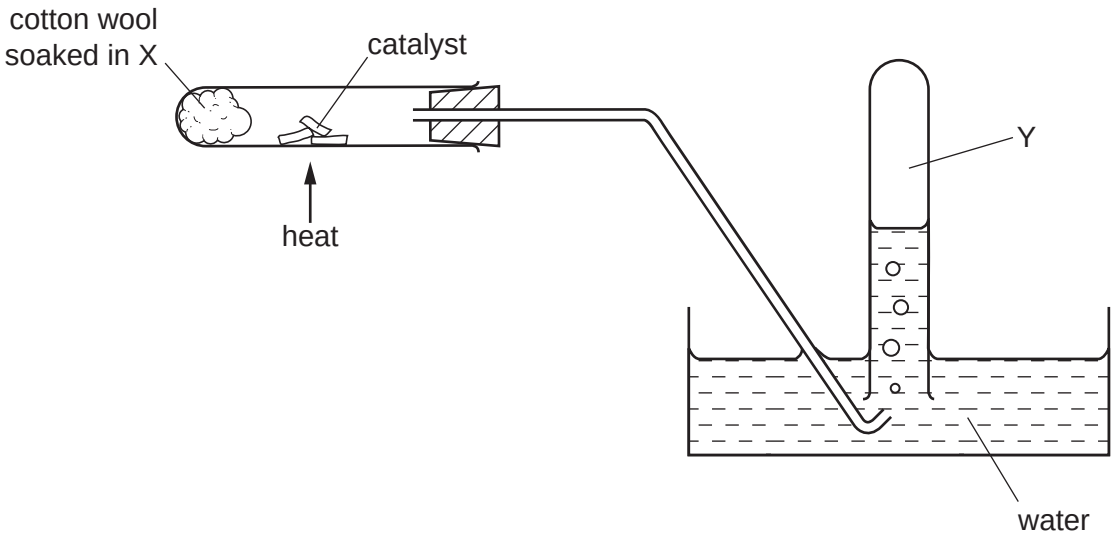
B Arabian Light

C Iranian Heavy

D North Sea

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38 The diagram shows the cracking of substance X.



Which type of organic compound is found in Y, which is **not** present in X?

A acid

B alcohol

C alkane

D alkene

39 In which reaction could one of the products belong to the same homologous series as the organic reactant?

A addition of steam to ethene

B combustion of an alkane

C cracking of an alkane

D polymerisation of ethene

40 Ethanol is produced from either ethene or sugar.

Which type of chemical reaction is used in each case?

	ethene → ethanol	sugar → ethanol
A	addition	fermentation
B	addition	fractional distillation
C	distillation	fermentation
D	distillation	fractional distillation

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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 †															

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

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.).

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