

International General Certificate of Secondary Education
CAMBRIDGE INTERNATIONAL EXAMINATIONS

CHEMISTRY

0620/1

PAPER 1 Multiple Choice

OCTOBER/NOVEMBER SESSION 2002

45 minutes

Additional materials:

Multiple Choice answer sheet

Soft clean eraser

Soft pencil (type B or HB is recommended)

TIME 45 minutes

INSTRUCTIONS TO CANDIDATES

Do not open this booklet until you are told to do so.

Write your name, Centre number and candidate number on the answer sheet in the spaces provided unless this has already been done for you.

There are **forty** questions in 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 very carefully the instructions on the answer sheet.

INFORMATION FOR CANDIDATES

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.

This question paper consists of 16 printed pages.



- 1 Heating a liquid causes it to become a vapour.

What happens to the molecules of the liquid during this process?

	the molecules become bigger	the molecules move further apart
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

- 2 Some sugar is dissolved in water.

Which diagram shows how the particles are arranged in the solution?

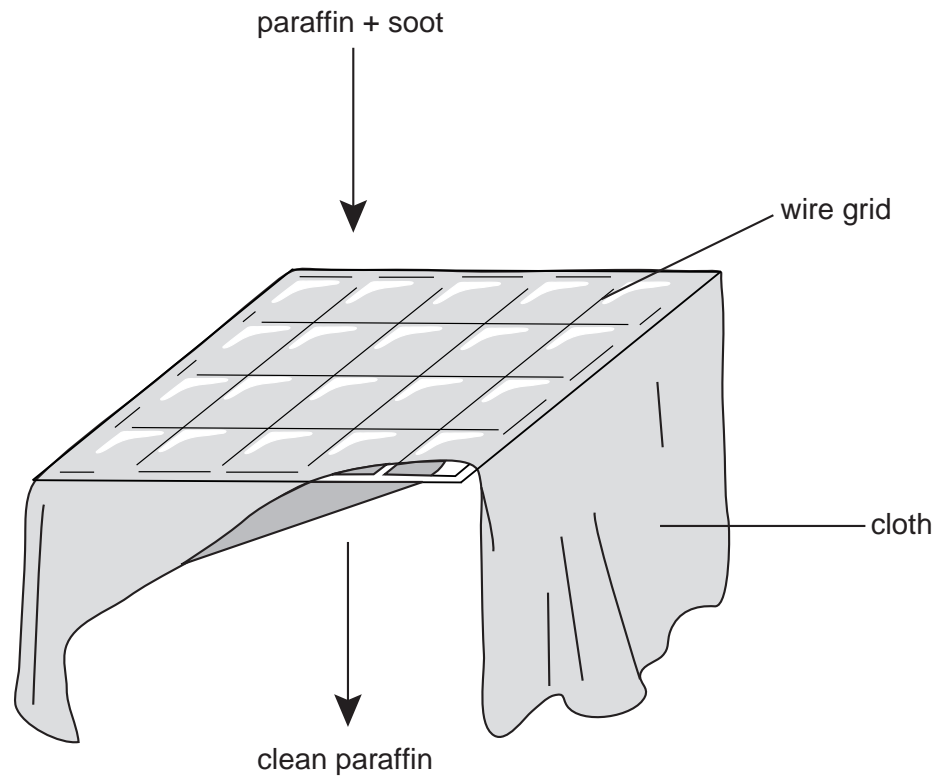
key

- sugar particle
- water particle

A **B** **C** **D**

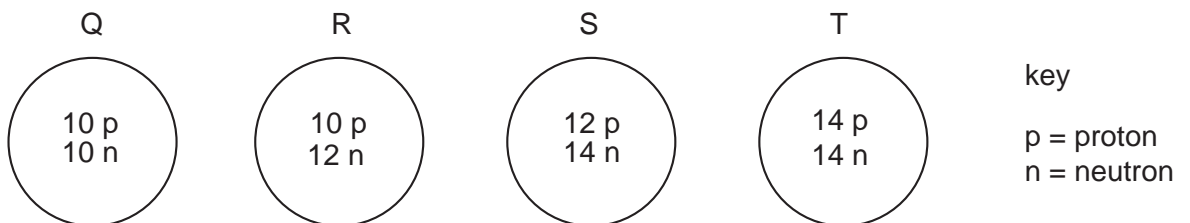
- 3 Which stages occur in distillation?
- A** condensation then evaporation
 - B** condensation then filtration
 - C** evaporation then condensation
 - D** filtration then evaporation

- 4 Some paraffin is contaminated with soot (carbon). The soot is removed as shown.



Which method is used to remove the soot?

- A cracking
 - B crystallisation
 - C diffusion
 - D filtration
- 5 The diagrams show the nuclei of four different atoms.



Which two atoms are isotopes of each other?

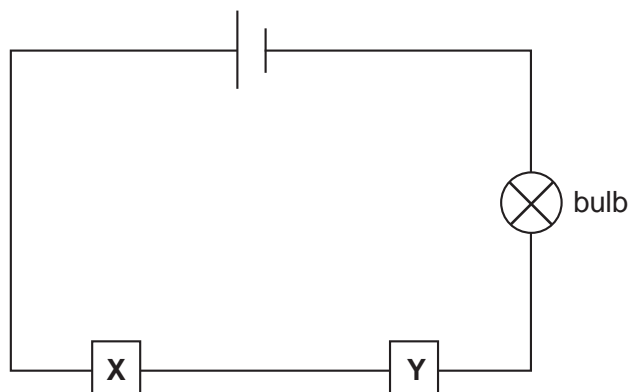
- A Q and R
 - B Q and T
 - C R and S
 - D S and T
- 6 Which atom has twice as many neutrons as protons?

- A ${}^1_1\text{H}$
- B ${}^2_1\text{H}$
- C ${}^3_1\text{H}$
- D ${}^4_2\text{He}$

7 Which change takes place when an atom becomes a positive ion?

- A An electron is added.
- B An electron is removed.
- C A proton is added.
- D A proton is removed.

8 The diagram shows an electric circuit.



For which two substances at X and Y does the bulb light up?

	X	Y
A	copper	graphite
B	copper	poly(ethene)
C	rubber	graphite
D	rubber	poly(ethene)

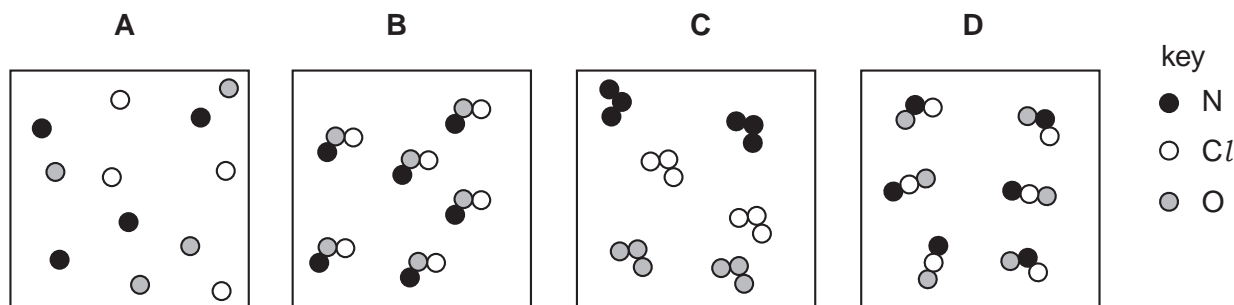
9 One method of producing carbon dioxide is to react calcium carbonate with dilute hydrochloric acid.

What is the balanced chemical equation for the reaction?

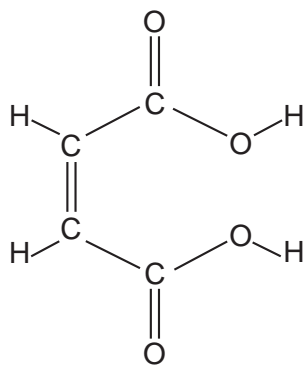
- A $\text{CaCO}_3 + \text{HCl} \rightarrow \text{CaO} + \text{CO}_2 + \text{HCl}$
- B $\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{CO}_2 + \text{H}_2\text{O}$
- C $\text{CaCO}_3 + 4\text{HCl} \rightarrow \text{CaCl}_4 + \text{CO}_2 + \text{H}_2 + \text{H}_2\text{O}$
- D $\text{Ca}(\text{HCO}_3)_2 + \text{HCl} \rightarrow \text{CaCl} + 2\text{CO}_2 + \text{H}_2\text{O}$

10 A gas has the molecular formula NOCl .

Which diagram could show molecules of the pure gas NOCl ?



11 Butenedioic acid has the structure shown.



What is the molecular formula of butenedioic acid?

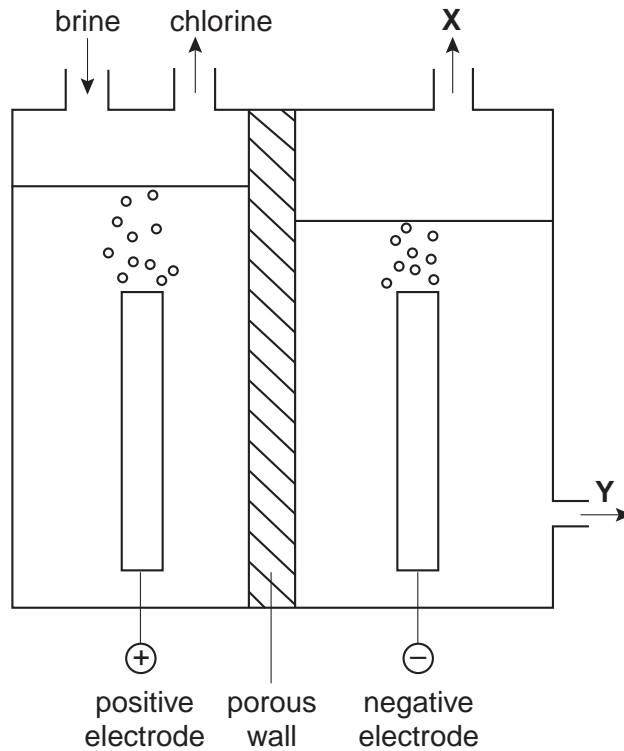
A CHO

B $\text{C}_4\text{H}_4\text{O}_4$

C $\text{C}_6\text{H}_4\text{O}_2$

D $\text{C}_6\text{H}_4\text{O}_6$

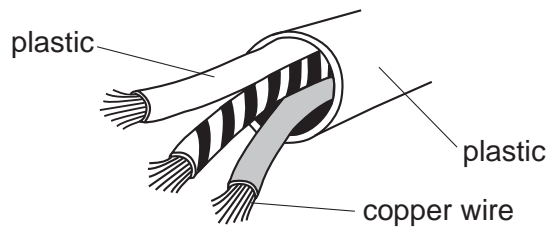
12 The diagram represents the electrolysis of brine (aqueous sodium chloride).



What are products **X** and **Y**?

	X	Y
A	hydrogen	aqueous sodium hydroxide
B	hydrogen	hydrochloric acid
C	oxygen	aqueous sodium hydroxide
D	oxygen	hydrochloric acid

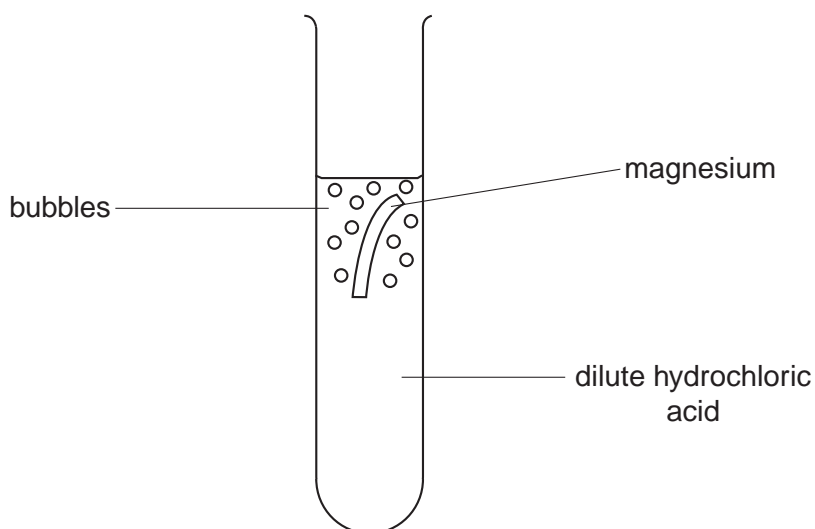
13 Copper wires in an electricity cable are covered in plastic.



Why is plastic used?

- A** It is an insulator.
- B** It is a polymer.
- C** It is hard.
- D** It melts easily.

- 14 A piece of magnesium is dropped into a test-tube containing dilute hydrochloric acid.



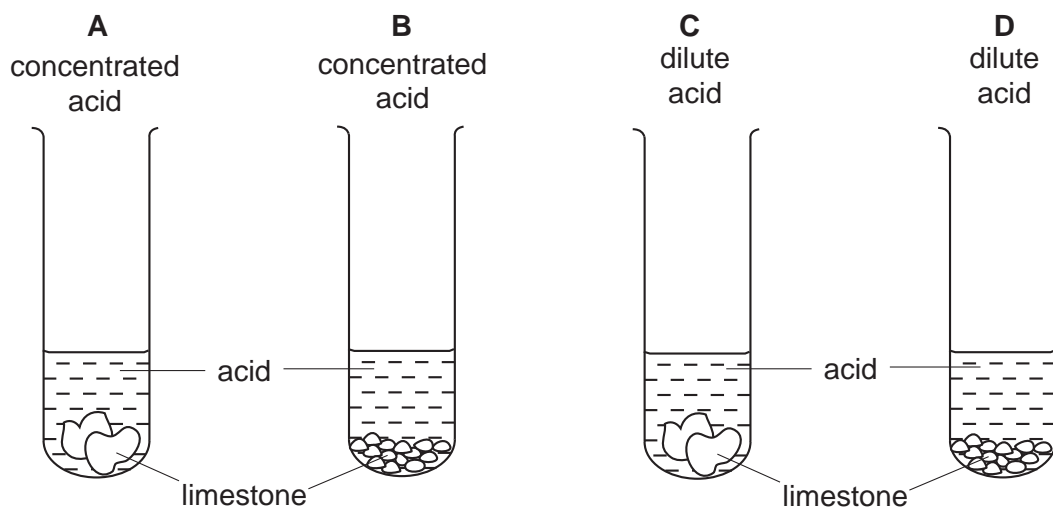
Why does the test-tube become warm?

- A Hydrogen is produced.
 - B The magnesium neutralises the acid.
 - C The reaction is endothermic.
 - D The reaction is exothermic.
- 15 An explosion in a coal mine was caused by the ignition of a mixture of methane and air.

Why did the mixture explode?

- A The heat absorbed by burning decreased the rate of burning.
- B The heat absorbed by burning increased the rate of burning.
- C The heat liberated by burning decreased the rate of burning.
- D The heat liberated by burning increased the rate of burning.

- 16 The diagram shows an experiment to compare the speed of reaction when limestone chips are added to acid.



In which test-tube is the reaction most rapid?

- 17 Which properties does a transition element have?

	density	melting point
A	high	high
B	high	low
C	low	high
D	low	low

- 18 Which metals can be obtained by heating their oxides with carbon?

	copper	iron	magnesium
A	X	✓	✓
B	✓	✓	X
C	X	X	✓
D	✓	X	X

- 19 Aqueous lead(II) nitrate is added to a solution containing iodide ions. Lead(II) iodide is formed.

Which type of reaction takes place?

- A** neutralisation
- B** oxidation
- C** precipitation
- D** reduction

20 Which element reacts with dilute sulphuric acid to produce hydrogen?

- A carbon
- B chlorine
- C copper
- D zinc

21 For which pH change is there the largest increase in acidity?

	initial pH	final pH
A	1	3
B	2	6
C	3	1
D	6	2

22 Which statement about the electrical conductivity of non-metals and the charge on their ions is correct?

	electrical conductivity	charge on ions
A	good	positive
B	good	negative
C	poor	positive
D	poor	negative

23 The corrosion of iron and its extraction from hematite are important processes.

Which terms describe the corrosion of iron and its extraction from hematite?

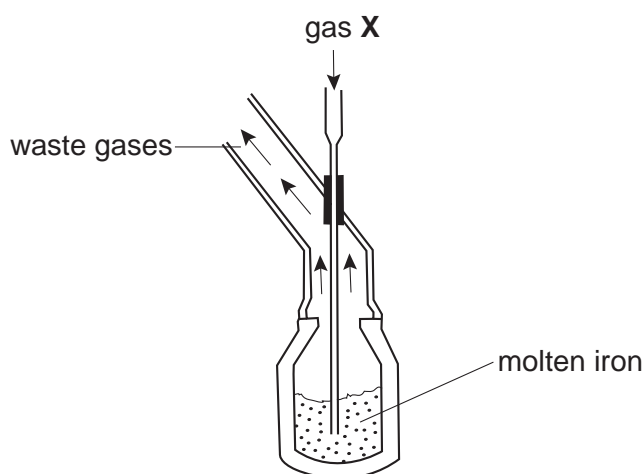
	corrosion	extraction
A	oxidation	oxidation
B	oxidation	reduction
C	reduction	oxidation
D	reduction	reduction

- 24 A few drops of aqueous bromine are added to separate aqueous solutions of potassium chloride, potassium bromide and potassium iodide.

Which solutions do **not** remove the colour of the bromine?

- A KBr and KCl only
 - B KBr and KI only
 - C KCl and KI only
 - D KBr, KCl and KI
- 25 Which metal produces a solution of a metal hydroxide when added to water?
- A calcium
 - B copper
 - C iron
 - D zinc
- 26 A highly reactive metal is likely to
- A form negative ions,
 - B occur naturally as an element,
 - C occur only as an oxide,
 - D oxidise rapidly in air.

27 The diagram shows the manufacture of steel.



What could gas **X** be?

- A carbon dioxide
- B chlorine
- C hydrogen
- D oxygen

28 A student writes the following statements.

- 1 Aluminium is used in the manufacture of aircraft bodies.
- 2 Aluminium is used to make stainless steel.
- 3 Mild steel is used in the manufacture of car bodies.

Which statements are correct?

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

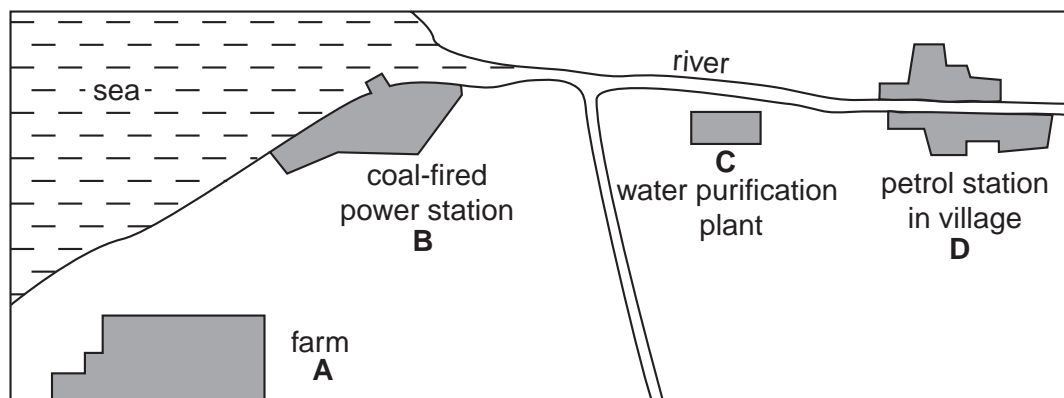
29 Which substance is used in the purification of water?

- A calcium sulphate
- B carbon dioxide
- C chlorine
- D sodium chloride

30 Which pollutant, found in car exhaust fumes, does **not** come from the fuel?

- A carbon monoxide
- B hydrocarbons
- C lead compounds
- D nitrogen oxides

31 Which place on the map is most likely to be producing large quantities of sulphur dioxide?



32 Why does a bicycle chain that is coated with oil **not** rust?

- A Oil dissolves any rust that forms.
- B Oil reacts with rust causing oxidation.
- C Oil reacts with oxygen so no rust forms.
- D Oil stops oxygen and water getting to the chain.

33 Which two other compounds should be added to ammonium sulphate to make a complete NPK fertiliser?

- A KNO_3 , Na_2HPO_4
- B K_2SO_4 , KNO_3
- C NaCl , $\text{Ca}_3(\text{PO}_4)_2$
- D NH_4Cl , Na_2HPO_4

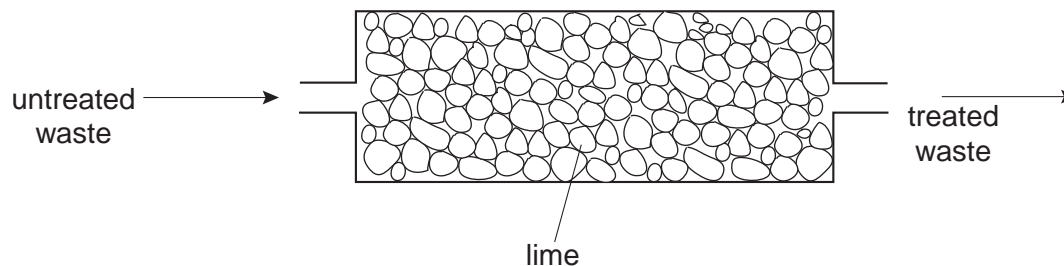
34 Two uses of oxygen are

- 1 burning acetylene in welding,
- 2 helping the breathing of hospital patients.

Which of these uses form carbon dioxide?

	use 1	use 2
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

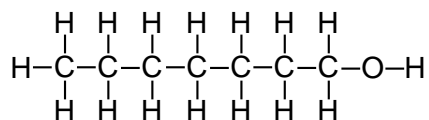
35 Lime is used to treat an industrial waste.



Which pH change occurs in the treatment?

	<u>untreated waste</u>	→	<u>treated waste</u>
A	acidic	→	neutral
B	alkaline	→	acidic
C	alkaline	→	neutral
D	neutral	→	acidic

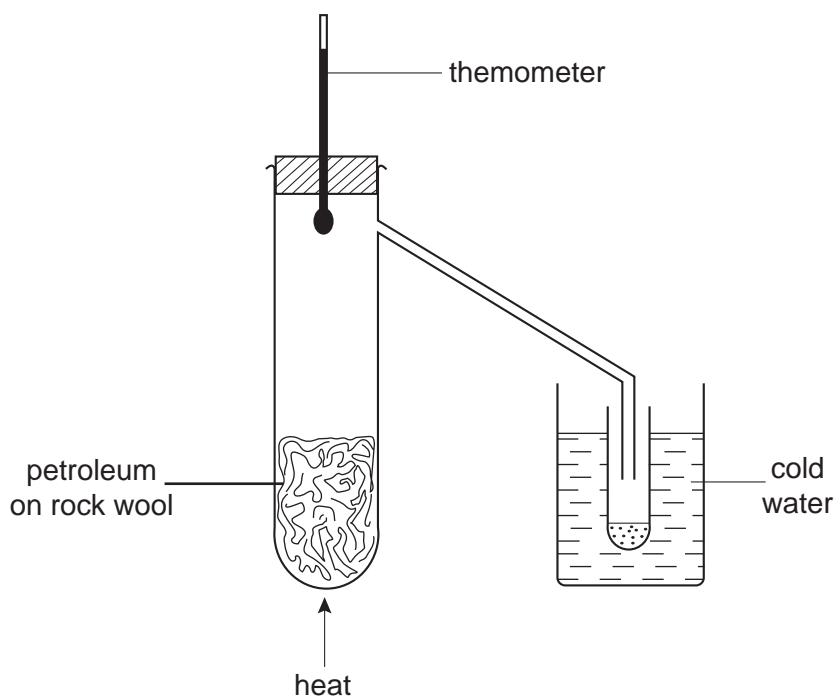
36 A compound **Q** has the structure shown.



What is the name of **Q**?

- A** heptane
- B** heptanoic acid
- C** heptanol
- D** heptene

37 A student sets up the apparatus shown to separate petroleum into its different liquid parts.



Why does this method of separation work?

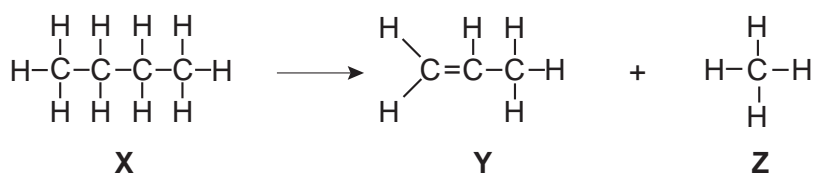
The liquids in petroleum have different

- A boiling points,
- B densities,
- C functional groups,
- D melting points.

38 Which row in the table correctly shows properties of decane?

	burns	is unsaturated
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

39 The equation shows the cracking of a hydrocarbon.



Which compounds are unsaturated?

- A** X only **B** Y only **C** X and Z **D** Y and Z

40 A student states that

ethanol reacts with water to form beer and wine;

ethanol and water are used as solvents in industry.

Which of the underlined words are correct?

	reacts	solvents
A	✓	✓
B	✓	X
C	X	✓
D	X	X

DATA SHEET
The Periodic Table of the Elements

		Group																																				
I	II	III	IV	V	VI	VII	O																															
7 Li Lithium 3	9 Be Beryllium 4	<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <td>1 H Hydrogen 1</td> </tr> </table>										1 H Hydrogen 1	11 B Boron 5	12 C Carbon 6	14 Si Silicon 14	15 P Phosphorus 15	16 S Sulphur 16	17 Cl Chlorine 17	18 Ar Argon 18	20 Ne Neon 10	4 He Helium 2																	
1 H Hydrogen 1																																						
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	20 Ne Neon 10	4 He Helium 2																													
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 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	101 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	209 Po Polonium 84	86 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	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	209 Po Polonium 84	210 At Astatine 85	222 Rn Radon 86	226 Ra Radium 88	227 Ac Actinium 89																			
87 Fr Francium	88 Ra Radium	89 Ac Actinium																																				
		<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <td>140 Ce Cerium 58</td> <td>141 Pr Praseodymium 59</td> <td>144 Nd Neodymium 60</td> <td>150 Sm Samarium 62</td> <td>152 Eu Europium 63</td> <td>157 Gd Gadolinium 64</td> <td>159 Tb Terbium 65</td> <td>162 Dy Dysprosium 66</td> <td>165 Ho Holmium 67</td> <td>167 Er Erbium 68</td> <td>169 Tm Thulium 69</td> <td>173 Yb Ytterbium 70</td> <td>175 Lu Lutetium 71</td> </tr> <tr> <td>232 Th Thorium 90</td> <td>238 Pa Protactinium 91</td> <td>238 U Uranium 92</td> <td>238 Np Neptunium 93</td> <td>238 Pu Plutonium 94</td> <td>238 Am Americium 95</td> <td>238 Cm Curium 96</td> <td>238 Bk Berkelium 97</td> <td>238 Cf Californium 98</td> <td>238 Es Einsteinium 99</td> <td>238 Fm Fermium 100</td> <td>238 Md Mendelevium 101</td> <td>238 No Nobelium 102</td> <td>238 Lr Lawrencium 103</td> </tr> </table>										140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	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	238 Pa Protactinium 91	238 U Uranium 92	238 Np Neptunium 93	238 Pu Plutonium 94	238 Am Americium 95	238 Cm Curium 96	238 Bk Berkelium 97	238 Cf Californium 98	238 Es Einsteinium 99	238 Fm Fermium 100	238 Md Mendelevium 101	238 No Nobelium 102	238 Lr Lawrencium 103
140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	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																										
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*58-71 Lanthanoid series
†90-103 Actinoid series

a	X
b	X

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.).