

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?

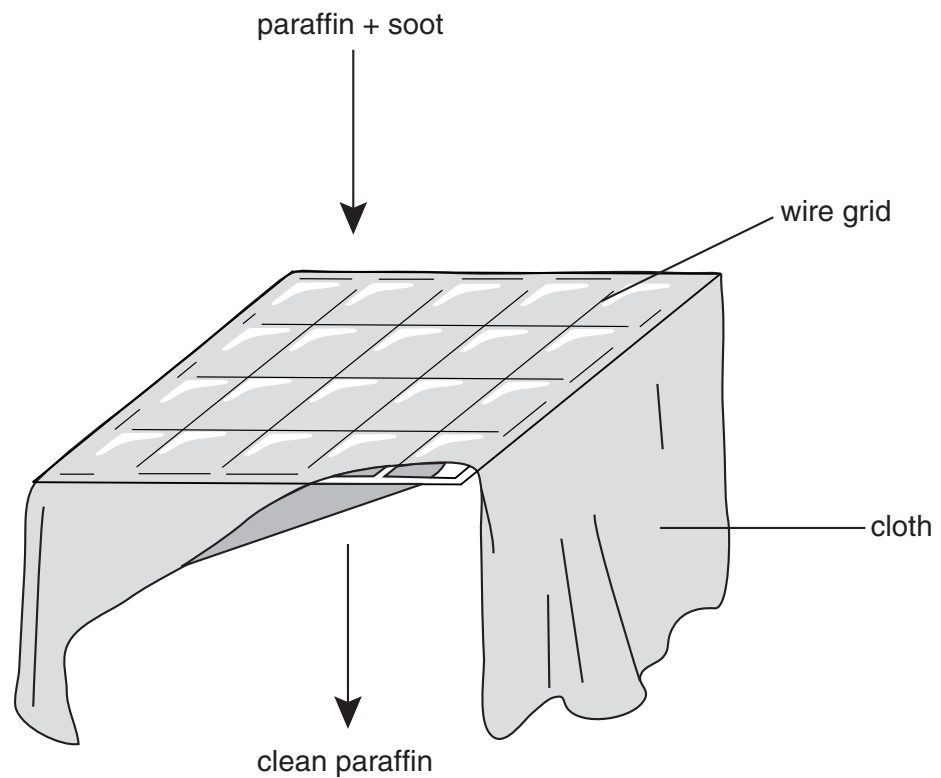
key

- sugar particle
- water particle

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

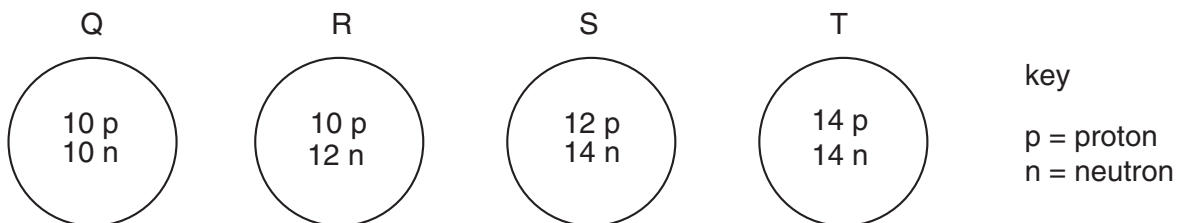
- 3 Which stages occur in distillation?
- A** condensation then evaporation
 - B** condensation then filtration
 - C** evaporation then condensation
 - D** filtration then evaporation

- 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?

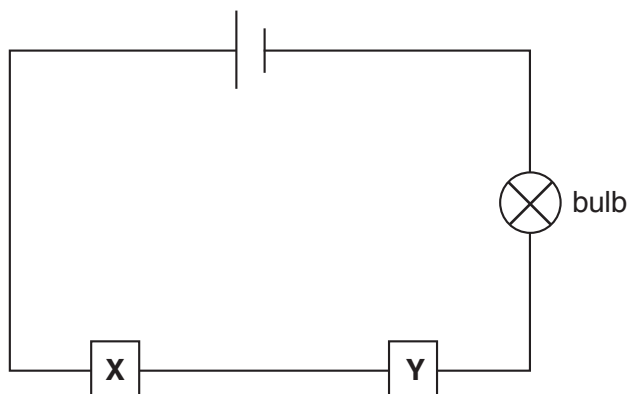
- A Q and R
 - B Q and T
 - C R and S
 - D S and T
- 6 Which atom has twice as many neutrons as protons?

- 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)

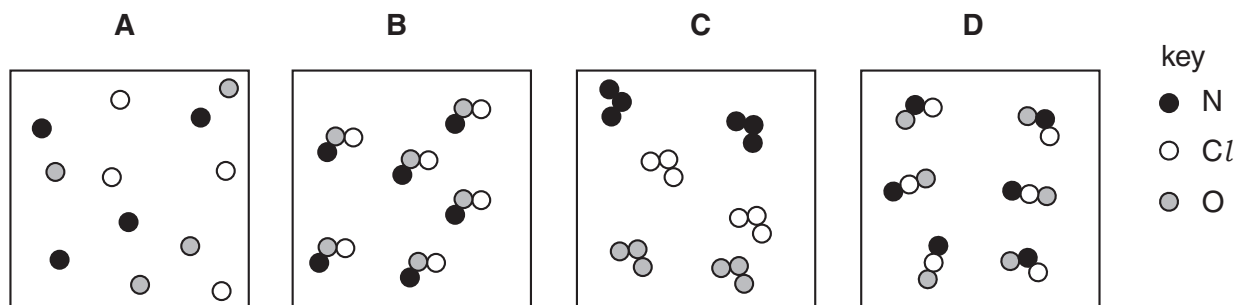
9 One method of producing carbon dioxide is to react calcium carbonate with dilute hydrochloric acid.

What is the balanced chemical equation for the reaction?

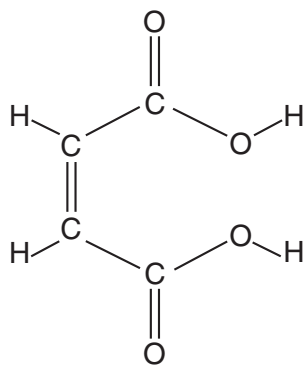
- A $\text{CaCO}_3 + \text{HCl} \rightarrow \text{CaO} + \text{CO}_2 + \text{HCl}$
- B $\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{CO}_2 + \text{H}_2\text{O}$
- C $\text{CaCO}_3 + 4\text{HCl} \rightarrow \text{CaCl}_4 + \text{CO}_2 + \text{H}_2 + \text{H}_2\text{O}$
- D $\text{Ca}(\text{HCO}_3)_2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

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?

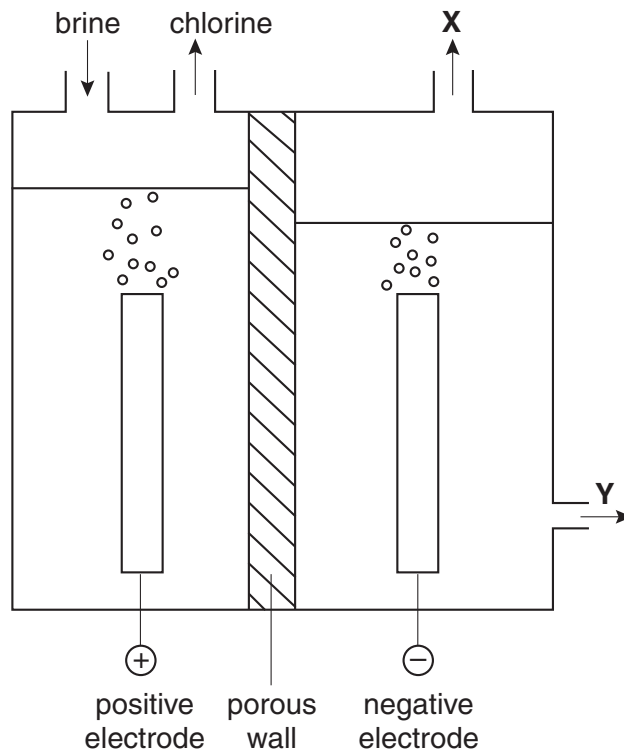
A CHO

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

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

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

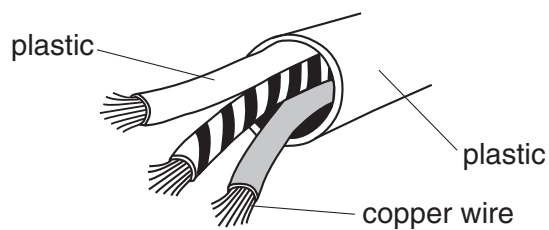
12 The diagram represents the electrolysis of brine (aqueous sodium chloride).



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

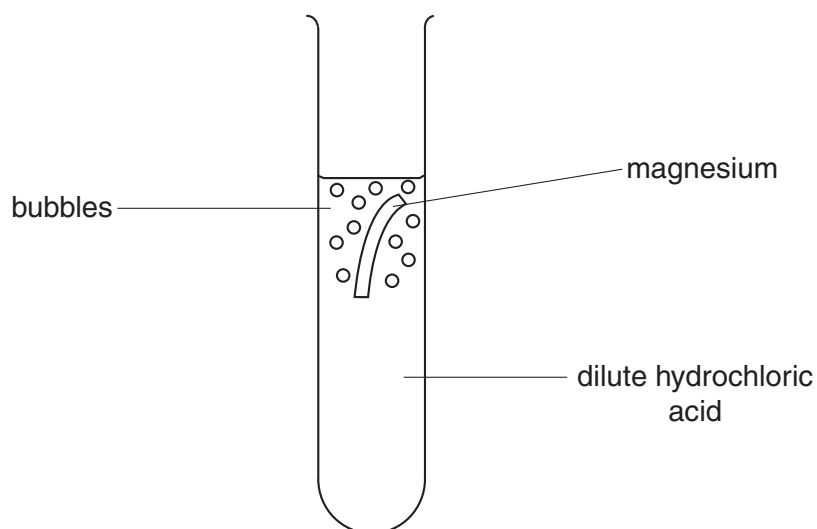
13 Copper wires in an electricity cable are covered in plastic.



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.



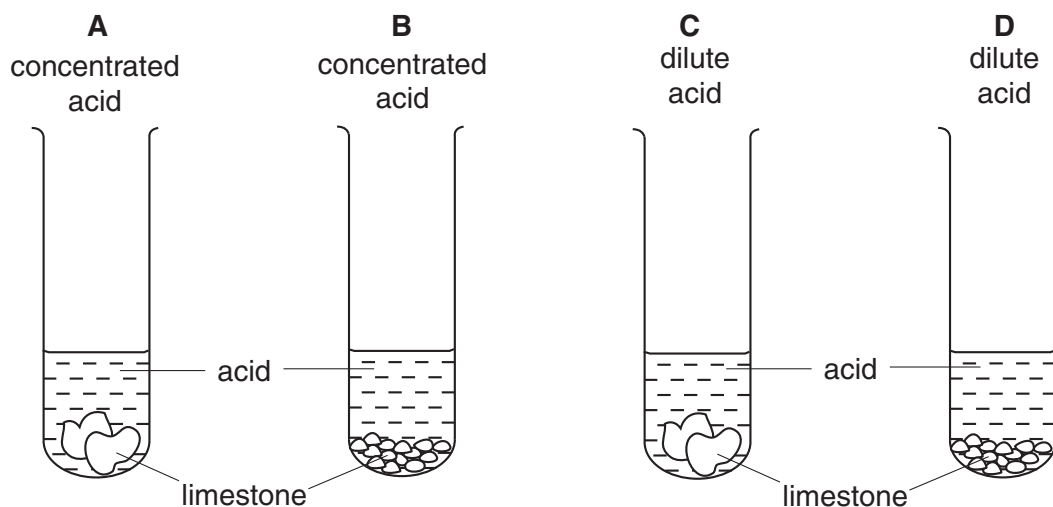
Why does the test-tube become warm?

- 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?

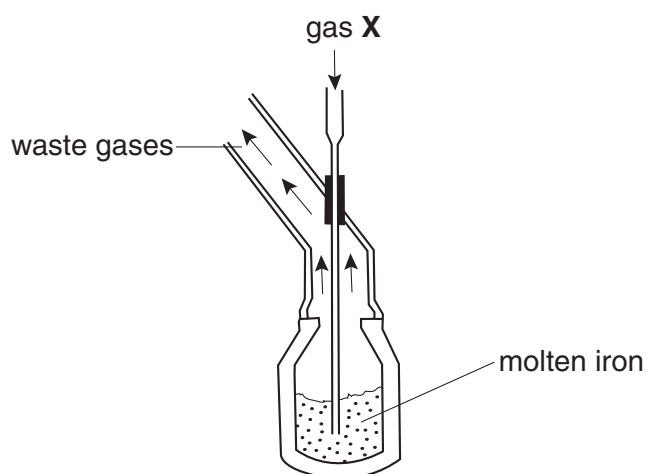
	corrosion	extraction
A	oxidation	oxidation
B	oxidation	reduction
C	reduction	oxidation
D	reduction	reduction

- 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

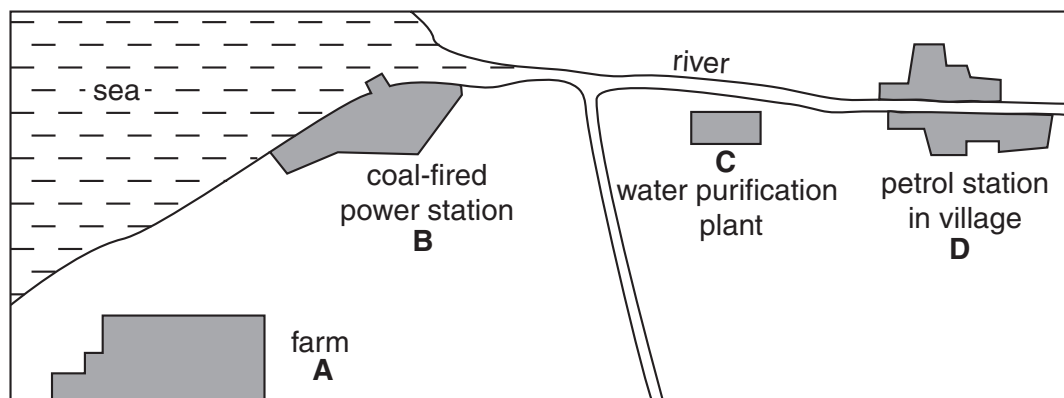
29 Which substance is used in the purification of water?

- 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

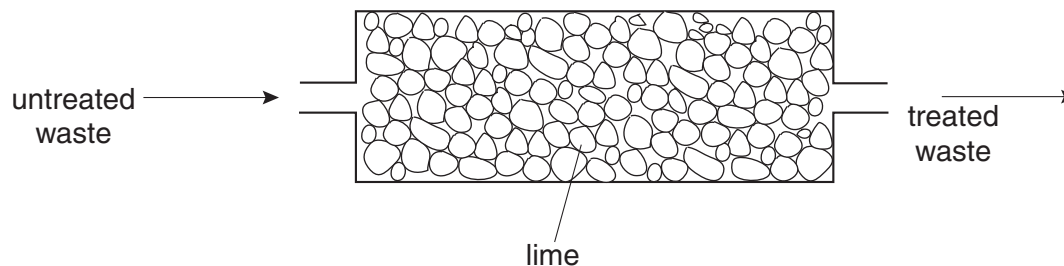
34 Two uses of oxygen are

- 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	✗	✗

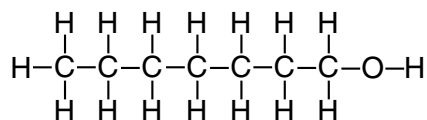
35 Lime is used to treat an industrial waste.



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

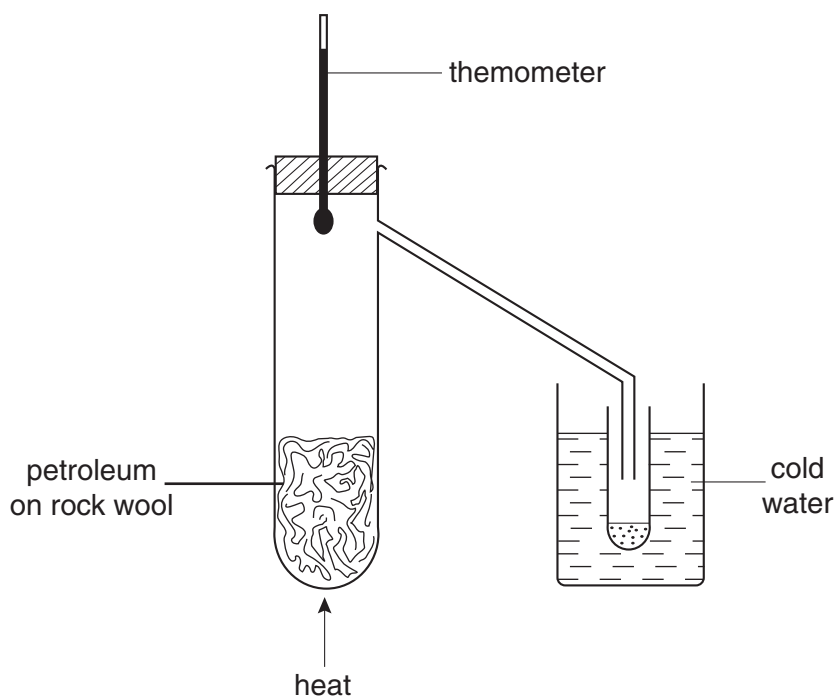
36 A compound **Q** has the structure shown.



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?

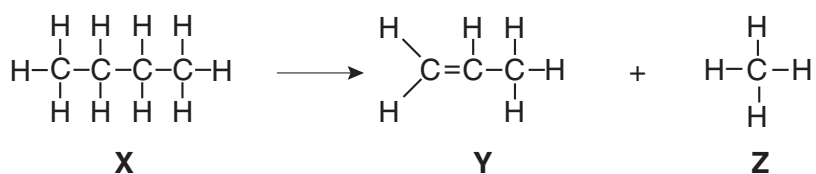
The liquids in petroleum have different

- 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="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td>1 H Hydrogen 1</td> <td colspan="10"></td> </tr> <tr> <td>11 B Boron 5</td> <td>12 C Carbon 6</td> <td>13 Al Aluminium 13</td> <td>14 Si Silicon 14</td> <td>15 P Phosphorus 15</td> <td>16 S Sulphur 16</td> <td>17 Cl Chlorine 17</td> <td>18 Ar Argon 18</td> <td>19 F Fluorine 9</td> <td>20 Ne Neon 10</td> <td>21 Na Sodium 11</td> <td>22 Mg Magnesium 12</td> <td>23 Al Aluminium 13</td> <td>24 Si Silicon 14</td> <td>25 P Phosphorus 15</td> <td>26 S Sulphur 16</td> <td>27 Cl Chlorine 17</td> <td>28 Ar Argon 18</td> <td>29 K Potassium 19</td> <td>30 Ca Calcium 20</td> <td>31 Sc Scandium 21</td> <td>32 Ti Titanium 22</td> <td>33 V Vanadium 23</td> <td>34 Cr Chromium 24</td> <td>35 Mn Manganese 25</td> <td>36 Fe Iron 26</td> <td>37 Ni Nickel 28</td> <td>38 Cu Copper 29</td> <td>39 Zn Zinc 30</td> <td>40 Ga Gallium 31</td> <td>41 Ge Germanium 32</td> <td>42 As Arsenic 33</td> <td>43 Se Selenium 34</td> <td>44 Br Bromine 35</td> <td>45 Kr Krypton 36</td> <td>46 Rb Rubidium 37</td> <td>47 Sr Strontium 38</td> <td>48 Y Yttrium 39</td> <td>49 Zr Zirconium 40</td> <td>50 Nb Niobium 41</td> <td>51 Mo Molybdenum 42</td> <td>52 Tc Technetium 43</td> <td>53 Ru Ruthenium 44</td> <td>54 Rh Rhodium 45</td> <td>55 Pd Palladium 46</td> <td>56 Ag Silver 47</td> <td>57 Cd Cadmium 48</td> <td>58 In Indium 49</td> <td>59 Sn Tin 50</td> <td>60 Sb Antimony 51</td> <td>61 Te Tellurium 52</td> <td>62 I Iodine 53</td> <td>63 Xe Xenon 54</td> <td>64 Ba Barium 56</td> <td>65 Ra Radium 88</td> <td>66 Fr Francium 87</td> <td>67 La Lanthanum 57</td> <td>68 Ce Cerium 58</td> <td>69 Pr Praseodymium 59</td> <td>70 Nd Neodymium 60</td> <td>71 Pm Promethium 61</td> <td>72 Sm Samarium 62</td> <td>73 Eu Europium 63</td> <td>74 Gd Gadolinium 64</td> <td>75 Tb Terbium 65</td> <td>76 Dy Dysprosium 66</td> <td>77 Ho Holmium 67</td> <td>78 Er Erbium 68</td> <td>79 Tm Thulium 69</td> <td>80 Yb Ytterbium 70</td> <td>81 Lu Lutetium 71</td> <td>82 Pb Lead 82</td> <td>83 Bi Bismuth 83</td> <td>84 Po Polonium 84</td> <td>85 At Astatine 85</td> <td>86 Rn Radon 86</td> <td>87 Ac Actinium 89</td> <td>88 Th Thorium 90</td> <td>89 Pa Protactinium 91</td> <td>90 U Uranium 92</td> <td>91 Np Neptunium 93</td> <td>92 Pu Plutonium 94</td> <td>93 Am Americium 95</td> <td>94 Cm Curium 96</td> <td>95 Bk Berkelium 97</td> <td>96 Cf Californium 98</td> <td>97 Es Einsteinium 99</td> <td>98 Fm Fermium 100</td> <td>99 Md Mendelevium 101</td> <td>100 No Nobelium 102</td> <td>101 Lr Lawrencium 103</td> </tr> </table>										1 H Hydrogen 1											11 B Boron 5	12 C Carbon 6	13 Al Aluminium 13	14 Si Silicon 14	15 P Phosphorus 15	16 S Sulphur 16	17 Cl Chlorine 17	18 Ar Argon 18	19 F Fluorine 9	20 Ne Neon 10	21 Na Sodium 11	22 Mg Magnesium 12	23 Al Aluminium 13	24 Si Silicon 14	25 P Phosphorus 15	26 S Sulphur 16	27 Cl Chlorine 17	28 Ar Argon 18	29 K Potassium 19	30 Ca Calcium 20	31 Sc Scandium 21	32 Ti Titanium 22	33 V Vanadium 23	34 Cr Chromium 24	35 Mn Manganese 25	36 Fe Iron 26	37 Ni Nickel 28	38 Cu Copper 29	39 Zn Zinc 30	40 Ga Gallium 31	41 Ge Germanium 32	42 As Arsenic 33	43 Se Selenium 34	44 Br Bromine 35	45 Kr Krypton 36	46 Rb Rubidium 37	47 Sr Strontium 38	48 Y Yttrium 39	49 Zr Zirconium 40	50 Nb Niobium 41	51 Mo Molybdenum 42	52 Tc Technetium 43	53 Ru Ruthenium 44	54 Rh Rhodium 45	55 Pd Palladium 46	56 Ag Silver 47	57 Cd Cadmium 48	58 In Indium 49	59 Sn Tin 50	60 Sb Antimony 51	61 Te Tellurium 52	62 I Iodine 53	63 Xe Xenon 54	64 Ba Barium 56	65 Ra Radium 88	66 Fr Francium 87	67 La Lanthanum 57	68 Ce Cerium 58	69 Pr Praseodymium 59	70 Nd Neodymium 60	71 Pm Promethium 61	72 Sm Samarium 62	73 Eu Europium 63	74 Gd Gadolinium 64	75 Tb Terbium 65	76 Dy Dysprosium 66	77 Ho Holmium 67	78 Er Erbium 68	79 Tm Thulium 69	80 Yb Ytterbium 70	81 Lu Lutetium 71	82 Pb Lead 82	83 Bi Bismuth 83	84 Po Polonium 84	85 At Astatine 85	86 Rn Radon 86	87 Ac Actinium 89	88 Th Thorium 90	89 Pa Protactinium 91	90 U Uranium 92	91 Np Neptunium 93	92 Pu Plutonium 94	93 Am Americium 95	94 Cm Curium 96	95 Bk Berkelium 97	96 Cf Californium 98	97 Es Einsteinium 99	98 Fm Fermium 100	99 Md Mendelevium 101	100 No Nobelium 102	101 Lr Lawrencium 103
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| 133 **Cs** Caesium 55 | 137 **Ba** Barium 56 | 139 **La** Lanthanum 57 | 140 **Ce** Cerium 58 | 141 **Pr** Praseodymium 59 | 144 **Nd** Neodymium 60 | 146 **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 | 209 **Po** Polonium 84 | 210 **Bi** Bismuth 83 | 208 **Pb** Lead 82 | 209 **At** Astatine 85 | 210 **Rn** Radon 86 | 226 **Ra** Radium 88 | 227 **Ac** Actinium 89 | 228 **Th** Thorium 90 | 232 **Pa** Protactinium 91 | 238 **U** Uranium 92 | 238 **Np** Neptunium 93 | 244 **Pu** Plutonium 94 | 244 **Am** Americium 95 | 244 **Cm** Curium 96 | 247 **Bk** Berkelium 97 | 251 **Cf** Californium 98 | 252 **Es** Einsteinium 99 | 257 **Fm** Fermium 100 | 261 **Md** Mendelevium 101 | 265 **No** Nobelium 102 | 269 **Lr** Lawrencium 103 |

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

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

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).