



Cambridge International Examinations  
Cambridge Ordinary Level

**CHEMISTRY**

**5070/11**

Paper 1 Multiple Choice

**May/June 2018**

**1 hour**

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



**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.

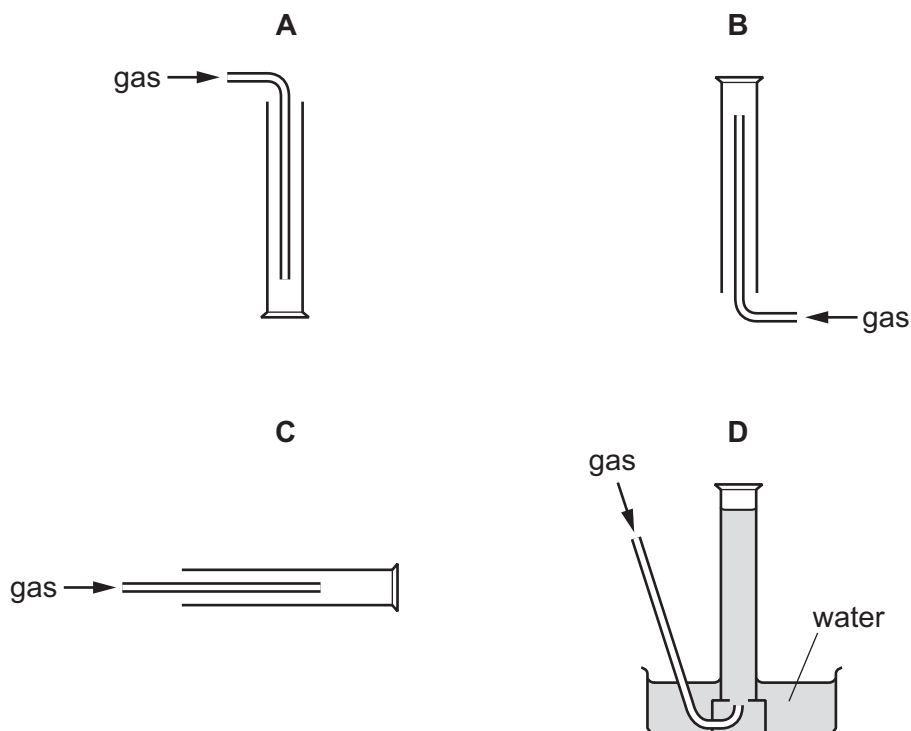
A copy of the Periodic Table is printed on page 16.

Electronic calculators may be used.

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

- 1 A gas is less dense than air and dissolves in water.

Which diagram shows the correct method of collecting this gas?



- 2 Which mixture can be separated into its components by adding water, stirring and filtering?

- A calcium carbonate and sodium chloride
- B magnesium and iron
- C sodium chloride and copper(II) sulfate
- D sulfuric acid and hydrochloric acid

- 3 Tests were carried out on an aqueous solution of an unknown compound, **P**. The observations are recorded in the table.

test	observation
aqueous sodium hydroxide added	green precipitate, soluble in excess giving a green solution
dilute nitric acid added then aqueous barium nitrate	white precipitate
dilute nitric acid added then aqueous silver nitrate	no precipitate

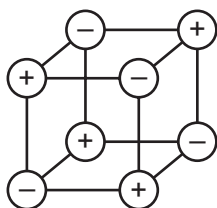
Which ions are present in **P**?

- A**  $\text{Cr}^{3+}$  and  $\text{Cl}^-$
- B**  $\text{Cr}^{3+}$  and  $\text{SO}_4^{2-}$
- C**  $\text{Fe}^{2+}$  and  $\text{Cl}^-$
- D**  $\text{Fe}^{2+}$  and  $\text{SO}_4^{2-}$
- 4 Which substance would diffuse most quickly?
- A** carbon dioxide at  $0^\circ\text{C}$
- B** carbon dioxide at  $25^\circ\text{C}$
- C** neon at  $0^\circ\text{C}$
- D** neon at  $25^\circ\text{C}$
- 5 The ion  $\text{Q}^{2+}$  has three complete shells of electrons.

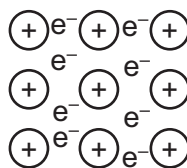
What is Q?

- A** calcium
- B** magnesium
- C** oxygen
- D** sulfur

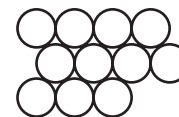
- 6 The diagrams show the arrangement of particles in three **solids**: X, Y and Z. The three solids are krypton, potassium and sodium chloride.



X



Y



Z

Which row correctly identifies X, Y and Z?

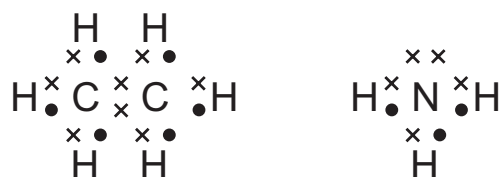
	X	Y	Z
<b>A</b>	krypton	potassium	sodium chloride
<b>B</b>	krypton	sodium chloride	potassium
<b>C</b>	sodium chloride	krypton	potassium
<b>D</b>	sodium chloride	potassium	krypton

- 7 In the electrolysis of  $\text{CuSO}_4(\text{aq})$ , what is the ionic equation for the reaction at the cathode?

- A**  $\text{Cu} + 2\text{e}^- \rightarrow \text{Cu}^{2+}$   
**B**  $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$   
**C**  $2\text{H}_2\text{O} + \text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}(\text{OH})_2 + \text{O}_2$   
**D**  $\text{SO}_4^{2-} + 4\text{H}^+ + 2\text{e}^- \rightarrow \text{H}_2\text{SO}_4 + \text{H}_2$

- 8 Ethane,  $\text{C}_2\text{H}_6$ , and ammonia,  $\text{NH}_3$ , are covalent compounds.

The dot-and-cross diagrams of these compounds are shown.



Which statements are correct?

- A molecule of ethane contains twice as many hydrogen atoms as a molecule of ammonia.
- An unreacted nitrogen atom has five outer electrons.
- In a molecule of ethane, the bond between the carbon atoms is formed by sharing two electrons, one from each carbon atom.

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

- 9 Which statement is correct?
- A All compounds are ionic.
- B All compounds conduct electricity when molten.
- C Each element only contains one type of atom.
- D In a mixture of substances, the proportions of the substances are always the same.
- 10 When 1 volume of gas **R** reacts with exactly 5 volumes of oxygen, it forms carbon dioxide and water only.

What is **R**?

- A butane, C<sub>4</sub>H<sub>10</sub>
- B ethane, C<sub>2</sub>H<sub>6</sub>
- C methane, CH<sub>4</sub>
- D propane, C<sub>3</sub>H<sub>8</sub>
- 11 Two characteristics of a gas, **G**, are given.
- **G** reduces copper(II) oxide to a pink-brown solid.
  - 1.4 g of **G** has a volume of 1.2 dm<sup>3</sup> at room temperature and pressure.

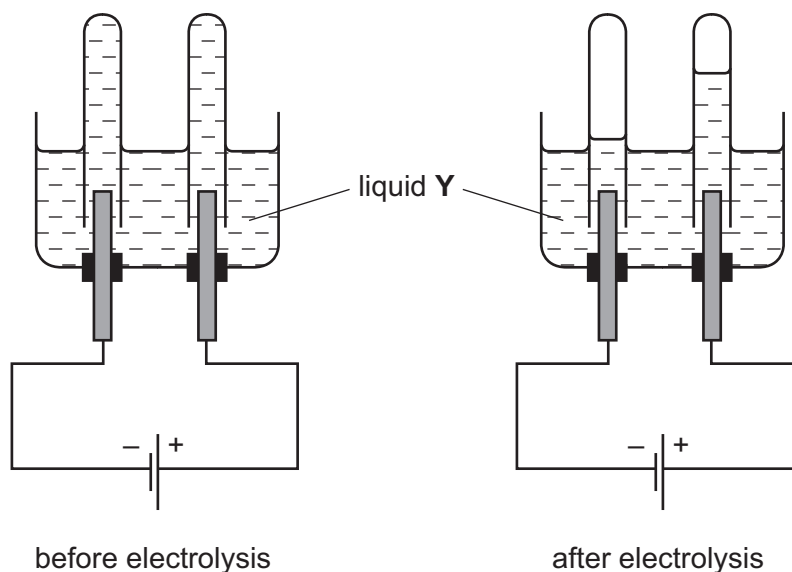
What is **G**?

- A carbon monoxide, CO
- B hydrogen, H<sub>2</sub>
- C nitrogen, N<sub>2</sub>
- D nitrogen monoxide, NO
- 12 The relative formula masses of four compounds are given.
- A student has a 1.0 g sample of each compound.

Which sample contains the highest number of moles of oxygen atoms?

	compound	relative formula mass
<b>A</b>	Al <sub>2</sub> O <sub>3</sub>	102
<b>B</b>	CuO	80
<b>C</b>	H <sub>2</sub> SO <sub>4</sub>	98
<b>D</b>	HNO <sub>3</sub>	63

13 The diagrams show an electrolysis experiment using inert electrodes.



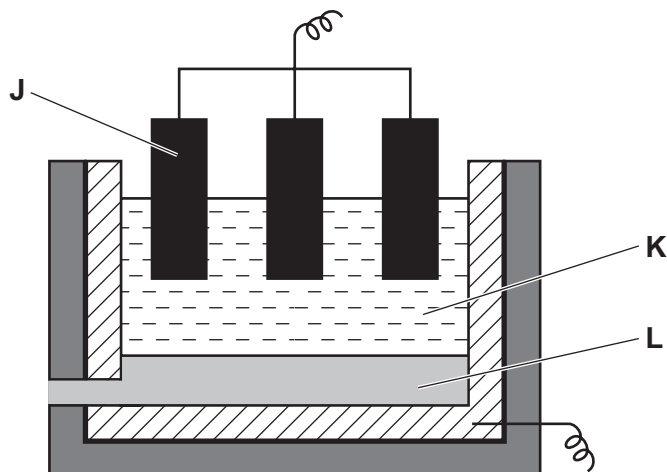
What could liquid **Y** be?

- A aqueous copper(II) sulfate
- B concentrated aqueous sodium chloride
- C dilute sulfuric acid
- D ethanol

14 Which statement about ionic compounds is correct?

- A Ionic compounds conduct electricity when solid because they contain charged particles that can move.
- B Ionic compounds consist of a lattice of positive ions and negative ions.
- C Most ionic compounds are solids at room temperature because of the strong attraction between electrons and positive ions.
- D When molten or in aqueous solution, ionic compounds conduct electricity because they contain electrons that can move.

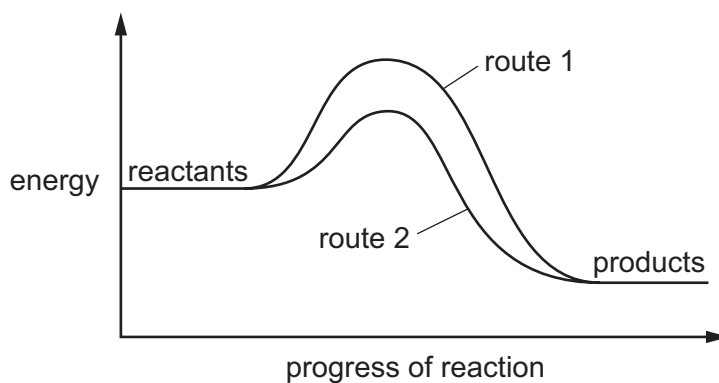
15 The diagram shows apparatus that can be used to extract aluminium from its ore.



What are J, K and L?

	J	K	L
A	negative electrode	aluminium oxide + cryolite	aluminium
B	negative electrode	cryolite	aluminium oxide
C	positive electrode	aluminium oxide	cryolite
D	positive electrode	aluminium oxide + cryolite	aluminium

16 The diagram shows the energy profile for a reaction.

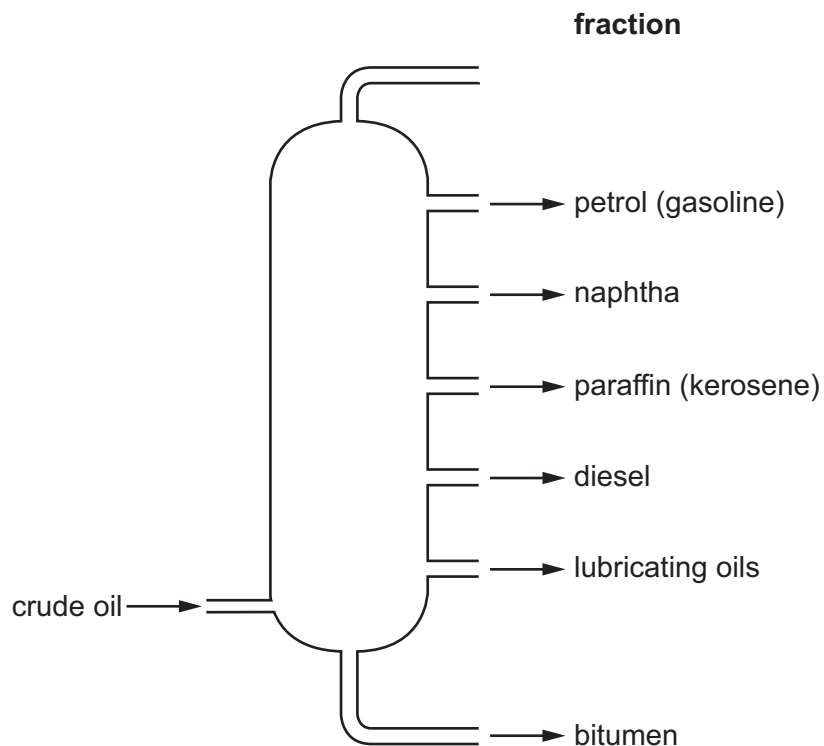


Which statements about this reaction are correct?

- 1 More energy is needed to break the bonds than is released when new bonds are formed.
- 2 Route 1 and route 2 give the same overall equation for the reaction.
- 3 Route 2 involves the use of a catalyst.
- 4 The reaction is exothermic.

A 1, 2 and 3      B 1 and 2 only      C 2, 3 and 4      D 3 and 4 only

17 The diagram shows the fractionation of petroleum (crude oil).



Which row shows the correct use for the fraction?

	fraction	use
<b>A</b>	bitumen	as a lubricant
<b>B</b>	diesel	for aircraft engines
<b>C</b>	naphtha	making road surfaces
<b>D</b>	paraffin (kerosene)	fuel for heating and cooking

18 Which compound is a constituent of petroleum (crude oil)?

- A**  $C_2H_5OH$       **B**  $CH_3CO_2H$       **C**  $C_8H_{18}$       **D**  $C_6H_{12}O_6$



19 A student wrote two conclusions about calcium carbonate.

conclusion 1 The reaction with dilute hydrochloric acid is faster with powdered calcium carbonate than with large pieces of calcium carbonate.

conclusion 2 Grinding large pieces of calcium carbonate to form powder increases the surface area.

Which statement is correct?

- A Both conclusions are correct and conclusion 2 explains conclusion 1.
- B Both conclusions are correct but conclusion 2 does not explain conclusion 1.
- C Conclusion 1 is correct but conclusion 2 is not correct.
- D Conclusion 2 is correct but conclusion 1 is not correct.

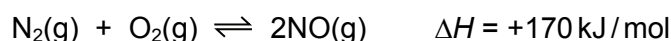
20 A compound decolourises acidified potassium manganate(VII).

What could this compound be?

- 1 magnesium chloride,  $MgCl_2$
- 2 iron(II) chloride,  $FeCl_2$
- 3 ethanol,  $C_2H_5OH$

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

21 Nitrogen reacts with oxygen in an equilibrium reaction.



When the reaction is at equilibrium, which statement is correct?

- A The concentration of nitrogen present will change with time.
- B The forward and backward reactions are taking place at the same rate.
- C The forward reaction releases heat energy.
- D There are more molecules on the left hand side of the equation than on the right.

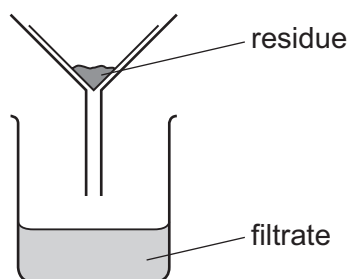
22 A solution of **W** has the following properties.

- When added in excess to solid ammonium chloride, a gas is given off that turns damp red litmus paper blue.
- When added in excess to a solution of pH 3, the resulting solution has a pH of 13.

What is **W**?

- A** a strong acid
- B** a strong base
- C** a weak acid
- D** a weak base

23 Pure lead(II) sulfate is prepared by mixing two substances, X and Y. When the reaction is complete the mixture is filtered. Pure lead(II) sulfate is obtained.



Which row shows the best way to prepare pure lead(II) sulfate?

	substance X	substance Y	method after filtration
<b>A</b>	aqueous lead(II) nitrate	aqueous sodium sulfate	crystallise the filtrate
<b>B</b>	aqueous lead(II) nitrate	aqueous sodium sulfate	wash and dry the residue
<b>C</b>	solid lead(II) carbonate	dilute sulfuric acid	crystallise the filtrate
<b>D</b>	solid lead(II) carbonate	dilute sulfuric acid	wash and dry the residue

24 What are the percentages by mass of nitrogen in ammonium nitrate,  $\text{NH}_4\text{NO}_3$ , and in calcium nitrate,  $\text{Ca}(\text{NO}_3)_2$ ?

	% nitrogen in $\text{NH}_4\text{NO}_3$	% nitrogen in $\text{Ca}(\text{NO}_3)_2$
<b>A</b>	18	14
<b>B</b>	18	17
<b>C</b>	35	9
<b>D</b>	35	17



30 Which statement about the reactions of some metals and metal compounds is correct?

- A Copper reacts with dilute hydrochloric acid to form hydrogen.
- B Sodium oxide is reduced to sodium metal by heating with carbon.
- C Zinc carbonate is more thermally stable than sodium carbonate.
- D Zinc displaces copper from aqueous copper(II) sulfate.

31 Which metal is used in the galvanising of iron?

- A calcium
- B copper
- C lead
- D zinc

32 Iron is obtained in the blast furnace from the ore haematite.

Which process takes place in the blast furnace?

- A Calcium carbonate is used to remove acidic impurities.
- B Coke is reduced to carbon dioxide.
- C Haematite is oxidised by carbon monoxide.
- D Haematite undergoes thermal decomposition.

33 Aluminium is a Group III element. It is extracted from its ore by electrolysis.

The position of aluminium in the Periodic Table indicates that its aqueous ion is likely to be .....1..... .

Its method of extraction indicates that aluminium is .....2..... in the reactivity series.

Which words complete gaps 1 and 2?

	1	2
<b>A</b>	coloured	high
<b>B</b>	coloured	low
<b>C</b>	colourless	high
<b>D</b>	colourless	low

34 Which pair of gases are both non-acidic?

- A ammonia and methane
- B carbon dioxide and ammonia
- C methane and nitrogen dioxide
- D nitrogen dioxide and carbon dioxide

35 Which term correctly describes the conversion of seawater into drinkable water?

- A chlorination
- B desalination
- C filtration
- D neutralisation

36 Which formula represents an alkane?

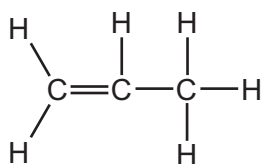
- A  $C_{31}H_{33}$       B  $C_{31}H_{60}$       C  $C_{31}H_{62}$       D  $C_{31}H_{64}$

37 Z is a compound that:

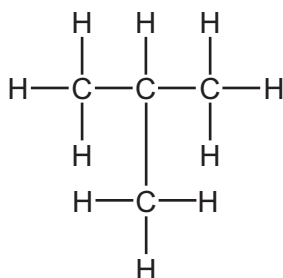
- can be formed, as the only other product, when the alkane  $C_8H_{18}$  is cracked to produce butane
- decolourises bromine water
- has a branched chain structure.

What is the formula of Z?

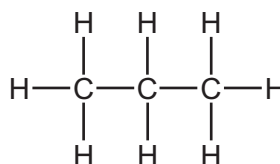
A



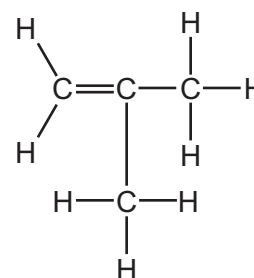
B



C

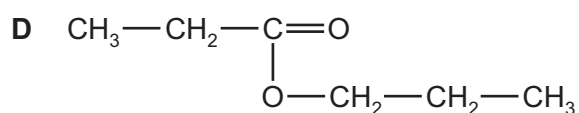
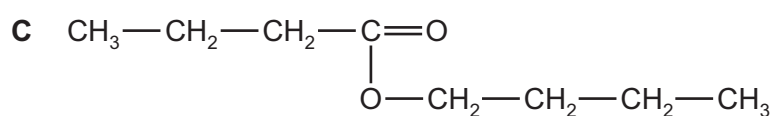
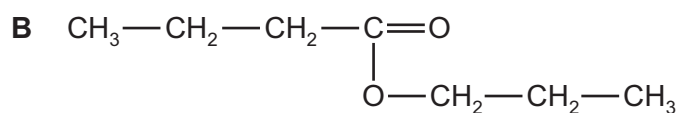
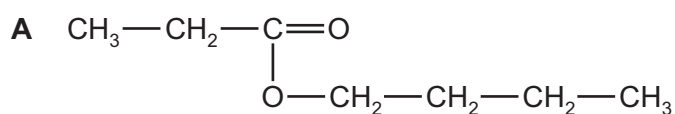


D



- 38 A carboxylic acid of molecular formula  $C_4H_8O_2$  reacts with an alcohol of molecular formula  $C_3H_8O$  to form an ester.

What could be the formula of the ester formed?



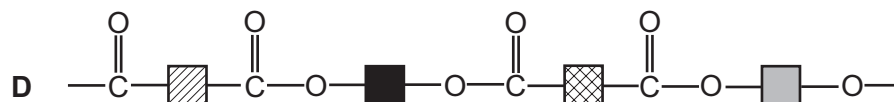
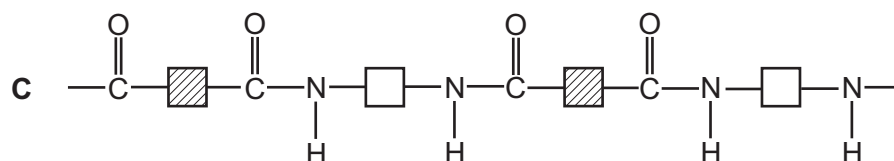
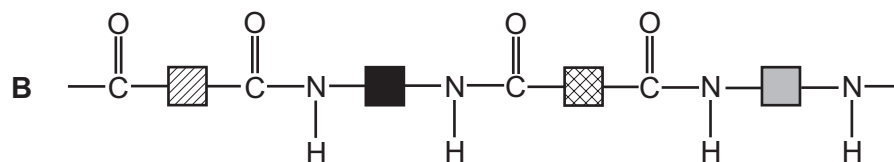
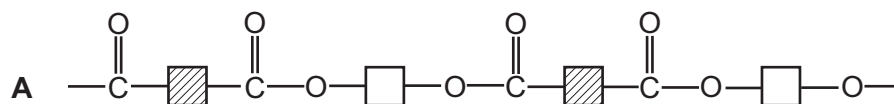
- 39 Some properties of compound **J** are listed.

- It reacts with potassium carbonate to produce carbon dioxide.
- It reacts with ethanol to produce a sweet-smelling liquid.
- It reacts with sodium hydroxide to produce a salt.

What is a possible identity of **J**?

- A ethanoic acid  
B ethanol  
C ethyl ethanoate  
D ethyl methanoate

40 Which partial structure represents nylon?



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The Periodic Table of Elements

		Group																																																																																																																																																																																																																			
I	II	III	IV	V	VI	VII	VIII					VIII																																																																																																																																																																																																									
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3 Li lithium 7	4 Be beryllium 9	<b>Key</b> atomic number atomic symbol name relative atomic mass										10 Ne neon 20																																																																																																																																																																																																									
11 Na sodium 23	12 Mg magnesium 24											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	18 Ar argon 40																																																																																																																																																																																																				
19 K potassium 39	20 Ca calcium 40	13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	36 Kr krypton 84	37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium —	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131	55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium —	85 At astatine —	86 Rn radon —																																																																																																																																																																										
87 Fr francium —	88 Ra radium —	89 La lanthanum 139	90 Ce cerium 140	91 Pr praseodymium 141	92 Nd neodymium 144	93 Pm promethium —	94 Pu plutonium 238	95 Am americium —	96 Cm curium —	97 Bk berkelium —	98 Cf californium —	99 Es einsteinium —	100 Fm fermium —	101 Md mendelevium —	102 No nobelium —	103 Lr lawrencium —	104 Rf rutherfordium —	105 Db dubnium —	106 Sg seaborgium —	107 Bh bohrium —	108 Hs hassium —	109 Mt meitnerium —	110 Ds darmstadtium —	111 Rg roentgenium —	112 Cn copernicium —	113 Nh nihonium —	114 Fl flerovium —	115 Lv livermorium —	116 Ts tennessine —	117 Og oganesson —	118 Uu unbinilium —	119 Uuh ununilium —	120 Uuq ununquadium —	121 Uuq ununquadium —	122 Uuq ununquadium —	123 Uuq ununquadium —	124 Uuq ununquadium —	125 Uuq ununquadium —	126 Uuq ununquadium —	127 Uuq ununquadium —	128 Uuq ununquadium —	129 Uuq ununquadium —	130 Uuq ununquadium —	131 Uuq ununquadium —	132 Uuq ununquadium —	133 Uuq ununquadium —	134 Uuq ununquadium —	135 Uuq ununquadium —	136 Uuq ununquadium —	137 Uuq ununquadium —	138 Uuq ununquadium —	139 Uuq ununquadium —	140 Uuq ununquadium —	141 Uuq ununquadium —	142 Uuq ununquadium —	143 Uuq ununquadium —	144 Uuq ununquadium —	145 Uuq ununquadium —	146 Uuq ununquadium —	147 Uuq ununquadium —	148 Uuq ununquadium —	149 Uuq ununquadium —	150 Uuq ununquadium —	151 Uuq ununquadium —	152 Uuq ununquadium —	153 Uuq ununquadium —	154 Uuq ununquadium —	155 Uuq ununquadium —	156 Uuq ununquadium —	157 Uuq ununquadium —	158 Uuq ununquadium —	159 Uuq ununquadium —	160 Uuq ununquadium —	161 Uuq ununquadium —	162 Uuq ununquadium —	163 Uuq ununquadium —	164 Uuq ununquadium —	165 Uuq ununquadium —	166 Uuq ununquadium —	167 Uuq ununquadium —	168 Uuq ununquadium —	169 Uuq ununquadium —	170 Uuq ununquadium —	171 Uuq ununquadium —	172 Uuq ununquadium —	173 Uuq ununquadium —	174 Uuq ununquadium —	175 Uuq ununquadium —	176 Uuq ununquadium —	177 Uuq ununquadium —	178 Uuq ununquadium —	179 Uuq ununquadium —	180 Uuq ununquadium —	181 Uuq ununquadium —	182 Uuq ununquadium —	183 Uuq ununquadium —	184 Uuq ununquadium —	185 Uuq ununquadium —	186 Uuq ununquadium —	187 Uuq ununquadium —	188 Uuq ununquadium —	189 Uuq ununquadium —	190 Uuq ununquadium —	191 Uuq ununquadium —	192 Uuq ununquadium —	193 Uuq ununquadium —	194 Uuq ununquadium —	195 Uuq ununquadium —	196 Uuq ununquadium —	197 Uuq ununquadium —	198 Uuq ununquadium —	199 Uuq ununquadium —	200 Uuq ununquadium —	201 Uuq ununquadium —	202 Uuq ununquadium —	203 Uuq ununquadium —	204 Uuq ununquadium —	205 Uuq ununquadium —	206 Uuq ununquadium —	207 Uuq ununquadium —	208 Uuq ununquadium —	209 Uuq ununquadium —	210 Uuq ununquadium —	211 Uuq ununquadium —	212 Uuq ununquadium —	213 Uuq ununquadium —	214 Uuq ununquadium —	215 Uuq ununquadium —	216 Uuq ununquadium —	217 Uuq ununquadium —	218 Uuq ununquadium —	219 Uuq ununquadium —	220 Uuq ununquadium —	221 Uuq ununquadium —	222 Uuq ununquadium —	223 Uuq ununquadium —	224 Uuq ununquadium —	225 Uuq ununquadium —	226 Uuq ununquadium —	227 Uuq ununquadium —	228 Uuq ununquadium —	229 Uuq ununquadium —	230 Uuq ununquadium —	231 Uuq ununquadium —	232 Uuq ununquadium —	233 Uuq ununquadium —	234 Uuq ununquadium —	235 Uuq ununquadium —	236 Uuq ununquadium —	237 Uuq ununquadium —	238 Uuq ununquadium —	239 Uuq ununquadium —	240 Uuq ununquadium —	241 Uuq ununquadium —	242 Uuq ununquadium —	243 Uuq ununquadium —	244 Uuq ununquadium —	245 Uuq ununquadium —	246 Uuq ununquadium —	247 Uuq ununquadium —	248 Uuq ununquadium —	249 Uuq ununquadium —	250 Uuq ununquadium —	251 Uuq ununquadium —	252 Uuq ununquadium —	253 Uuq ununquadium —	254 Uuq ununquadium —	255 Uuq ununquadium —	256 Uuq ununquadium —	257 Uuq ununquadium —	258 Uuq ununquadium —	259 Uuq ununquadium —	260 Uuq ununquadium —	261 Uuq ununquadium —	262 Uuq ununquadium —	263 Uuq ununquadium —	264 Uuq ununquadium —	265 Uuq ununquadium —	266 Uuq ununquadium —	267 Uuq ununquadium —	268 Uuq ununquadium —	269 Uuq ununquadium —	270 Uuq ununquadium —	271 Uuq ununquadium —	272 Uuq ununquadium —	273 Uuq ununquadium —	274 Uuq ununquadium —	275 Uuq ununquadium —	276 Uuq ununquadium —	277 Uuq ununquadium —	278 Uuq ununquadium —	279 Uuq ununquadium —	280 Uuq ununquadium —	281 Uuq ununquadium —	282 Uuq ununquadium —	283 Uuq ununquadium —	284 Uuq ununquadium —	285 Uuq ununquadium —	286 Uuq ununquadium —	287 Uuq ununquadium —	288 Uuq ununquadium —	289 Uuq ununquadium —	290 Uuq ununquadium —	291 Uuq ununquadium —	292 Uuq ununquadium —	293 Uuq ununquadium —	294 Uuq ununquadium —	295 Uuq ununquadium —	296 Uuq ununquadium —	297 Uuq ununquadium —	298 Uuq ununquadium —	299 Uuq ununquadium —	300 Uuq ununquadium —

lanthanoids

actinoids

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).