Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

CHEMISTRY **5070/11**

Paper 1 Multiple Choice **May/June 2016**

1 hour

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

4255071317

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 **14** printed pages and **2** blank pages.

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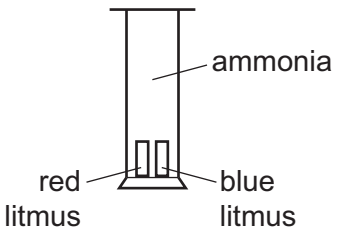
1 Which oxide is amphoteric?

A Al_2O_3 **B** CO_2 **C** Na_2O **D** SO_2

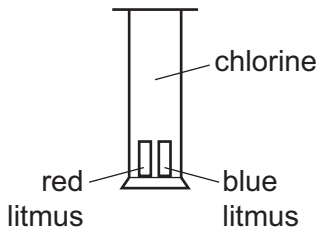
2 Four gas jars each contain one of the gases ammonia, chlorine, hydrogen chloride and oxygen. A strip of damp blue litmus paper and a strip of damp red litmus paper are placed in each jar.

In which gas jar will both the damp blue litmus paper and the damp red litmus paper change colour?

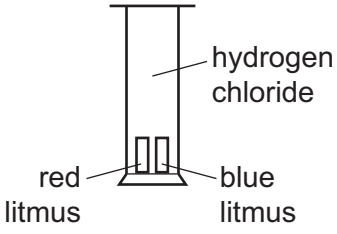
A



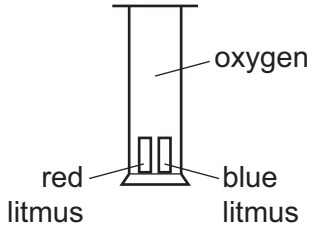
B



C



D



3 How can a pure sample of barium sulfate be obtained from barium carbonate?

A Dissolve it in dilute hydrochloric acid, add dilute sulfuric acid, filter and crystallise.

B Dissolve it in dilute hydrochloric acid, add dilute sulfuric acid, filter and wash.

C Dissolve it in water, add dilute sulfuric acid, filter and crystallise.

D Dissolve it in water, add dilute sulfuric acid, filter and wash.

4 Which statement is **not** correct?

A Energy is released when a liquid changes into a solid.

B Particles move faster in the gaseous state than in the liquid state.

C The carbon atoms in gaseous methane are further apart than those in solid diamond.

D There is a large decrease in the volume of a solid metal when pressure is applied to it.

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5 The symbols for two ions are shown.

$$^{19}_{9}F^{-} \qquad\qquad ^{21}_{11}Na^{+}$$

Which statement is correct?

A The fluoride ion contains more electrons than the sodium ion.

B The sodium ion contains more neutrons than the fluoride ion.

C The two ions contain the same number of electrons as each other.

D The two ions contain the same number of protons as each other.

6 Which dot-and-cross diagram, showing all the outer shell electrons of each atom, is **not** correct?

A



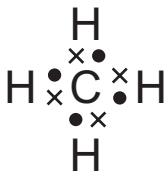
B



C



D



7 Which statement shows that graphite and diamond are different forms of the element carbon?

A Both graphite and diamond have giant molecular structures.

B Complete combustion of equal masses of graphite and diamond produces equal masses of carbon dioxide and no other products.

C Graphite and diamond have different melting points.

D Graphite conducts electricity, whereas diamond does not.

8 In order to form a compound with oxygen, an atom of a Group II element must

A transfer two electrons to an atom of oxygen.

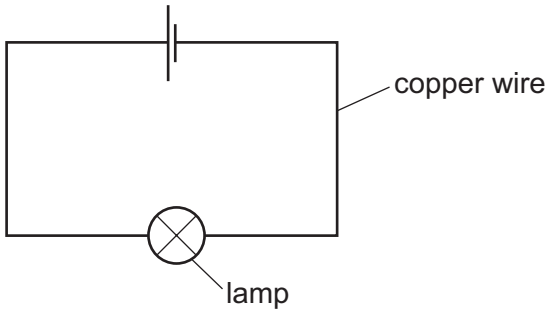
B receive two electrons from an atom of oxygen.

C share two electrons with an atom of oxygen.

D bond with two atoms of oxygen.

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9 Copper wire is used to complete an electrical circuit.



What happens in the copper wire?

A Electrons move along the wire to the negative terminal. Positive ions stay in position.

B Electrons move along the wire to the positive terminal. Positive ions move to the negative terminal.

C Electrons move along the wire to the positive terminal. Positive ions stay in position.

D Negative ions move along the wire to the positive terminal. Positive ions move to the negative terminal.

10 Which uses for sulfuric acid are correct?

1 as a bleach in the manufacture of wood pulp for paper

2 as a food preservative in tinned foods

3 as a raw material in the manufacture of detergents

4 as a fertiliser

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

11 Group I metals form compounds with Group VII halogens. The compounds formed are ……1…… in water and contain ……2…… bonds.

Which words correctly complete gaps 1 and 2?

	1	2
A	insoluble	covalent
B	insoluble	ionic
C	soluble	covalent
D	soluble	ionic

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12 Compound **P** is the only substance formed when two volumes of ammonia gas react with one volume of carbon dioxide gas (both volumes being measured at r.t.p.).

What is the formula of **P**?

A $NH_2CO_2NH_4$

B $(NH_2)_2CO$

C $NH_4CO_2NH_4$

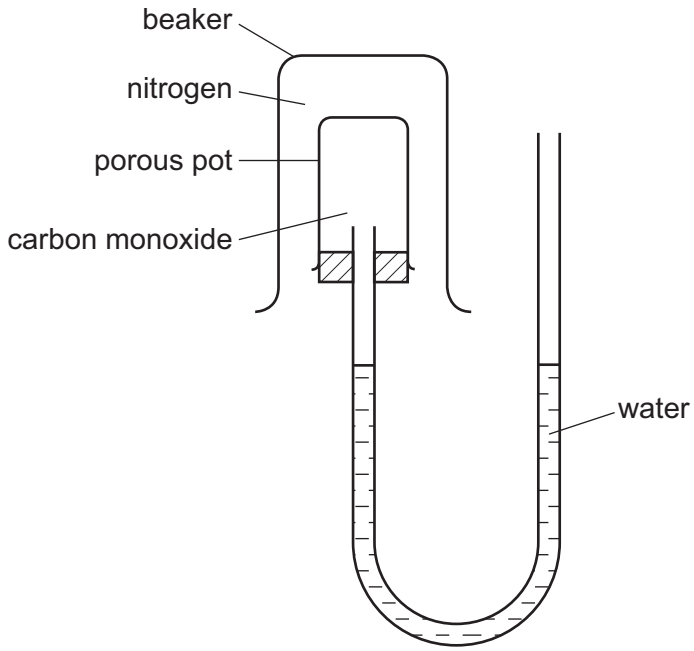
D $(NH_4)_2CO_3$

13 Two isotopes of chlorine are ^{35}Cl and ^{37}Cl.

Using these isotopes, how many different relative molecular masses are possible for the compound with molecular formula $C_2H_3Cl_3$?

A 2 **B** 3 **C** 4 **D** 5

14 Gases can diffuse through porous pots. The diagram shows a beaker full of nitrogen inverted over a porous pot containing carbon monoxide.



The water level does not move.

Which statement explains this?

A Nitrogen is almost inert.

B The two gases have equal molecular masses.

C Both gases have two atoms in a molecule.

D Neither gas is soluble in water.

15 Aqueous copper(II) sulfate is electrolysed using carbon electrodes.

Which observations will be made?

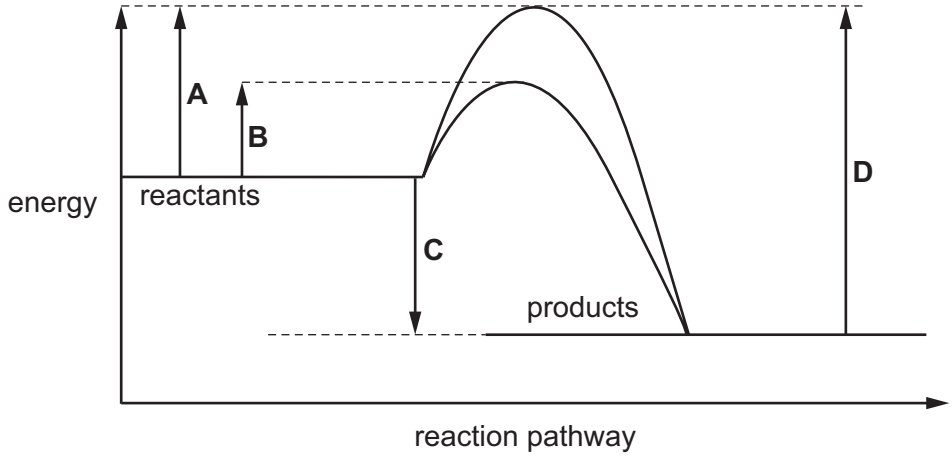
	at the positive electrode	electrolyte	at the negative electrode
A	colourless gas forms	blue colour fades	pink solid forms
B	colourless gas forms	no change	colourless gas forms
C	electrode decreases in mass	blue colour fades	colourless gas forms
D	electrode decreases in mass	no change	pink solid forms

16 Which ion is **not** present in dilute sulfuric acid?

A H^+ **B** OH^- **C** SO_3^{2-} **D** SO_4^{2-}

17 The diagram shows an energy profile diagram for a chemical reaction, both with and without a catalyst.

Which energy change is the activation energy for the catalysed reaction?



18 Which equation does **not** represent a redox reaction?

A $2NH_3 + H_2SO_4 \rightarrow (NH_4)_2SO_4$

B $2SO_2 + O_2 \rightarrow 2SO_3$

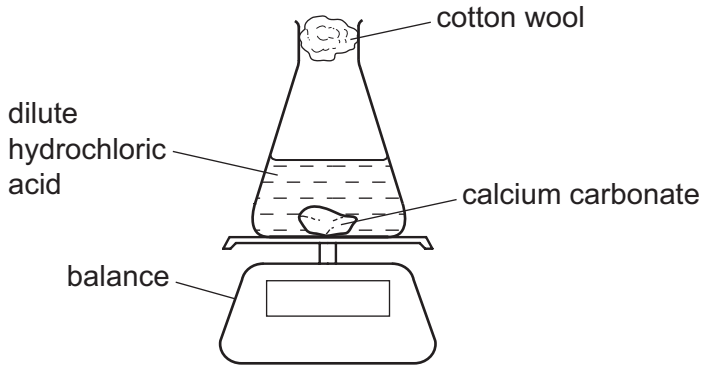
C $2KI + Cl_2 \rightarrow 2KCl + I_2$

D $Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$

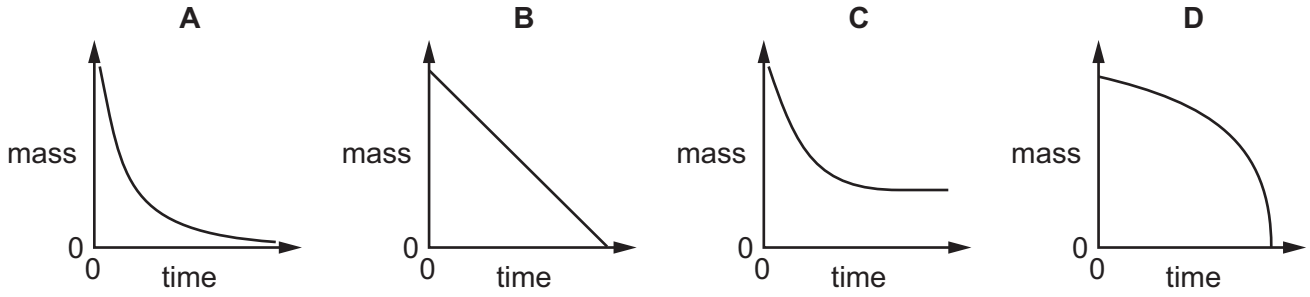
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19 The diagram shows the apparatus used to measure the rate of the reaction between calcium carbonate and dilute hydrochloric acid.

The mass of the flask and the contents is measured at regular intervals of time.



Which graph correctly shows how the mass of the flask and contents changes with time?



20 Which row correctly compares high carbon steels and low carbon steels?

	high carbon steels	low carbon steels
A	stronger	more brittle
B	stronger	more easily shaped
C	weaker	more brittle
D	weaker	more easily shaped

21 Which process does **not** involve the use of a catalyst?

A the extraction of iron from haematite in a blast furnace

B the manufacture of sulfur trioxide

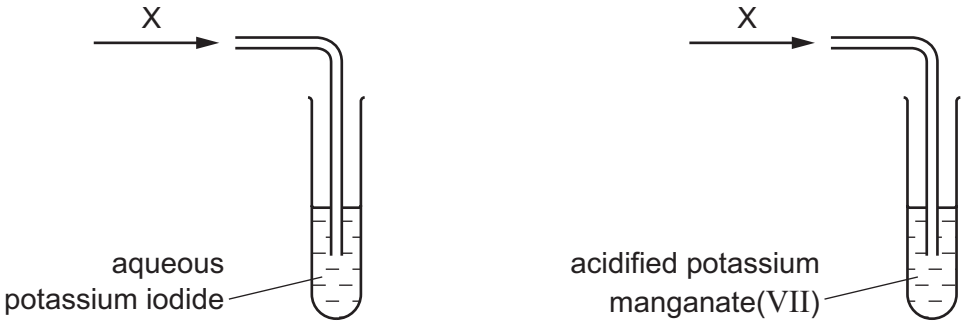
C the production of ammonia from nitrogen and hydrogen

D the redox reactions that remove combustion pollutants from car exhausts

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[Turn over

22 Gaseous compound X is an oxidising agent. X is bubbled through separate solutions of aqueous potassium iodide and acidified potassium manganate(VII).



Which row shows the colour changes when X is bubbled through these two solutions?

	aqueous potassium iodide	acidified potassium manganate(VII)
A	brown to colourless	no change
B	brown to colourless	purple to colourless
C	colourless to brown	no change
D	colourless to brown	purple to colourless

23 Which metal oxide will be reduced by heating with iron?

A calcium oxide

B lead oxide

C magnesium oxide

D zinc oxide

24 Which pair of substances can be used to prepare a sample of lead(II) chloride when added to water and mixed?

A lead and sodium chloride

B lead(II) nitrate and sodium chloride

C lead(II) carbonate and sodium chloride

D lead and hydrochloric acid

25 The pH of an aqueous solution of hydrochloric acid is 2.

What will be the pH of the acid after the addition of 10 g of sodium chloride?

A 1 **B** 2 **C** 7 **D** 9

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26 Which statement about the elements in the Periodic Table is correct?

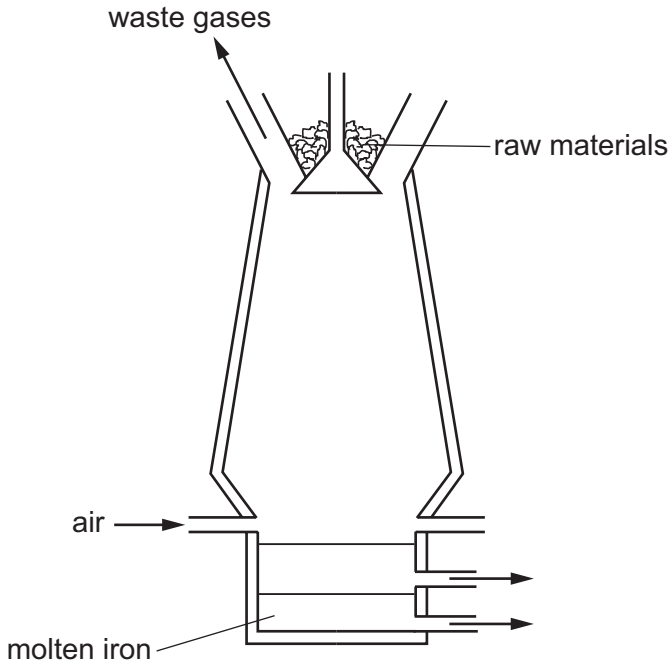
A All the elements in the same group of the Periodic Table have the same reactivity.

B All the elements with four electrons in their outer shells are metals.

C An element in Group II of the Periodic Table would form an ion with a 2– charge.

D Elements in the same period of the Periodic Table have the same number of shells of electrons.

27 Iron is extracted from haematite in the blast furnace.



Which other raw material is added in this extraction?

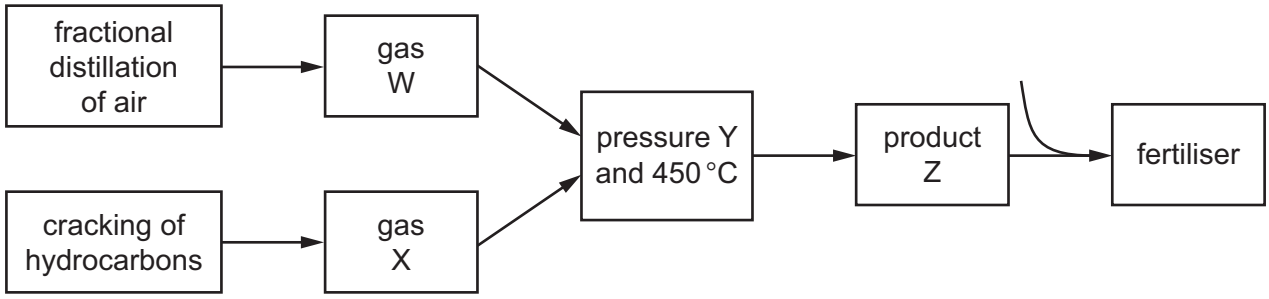
A bauxite

B cryolite

C limestone

D slag

28 The diagram shows a flow chart for the manufacture of fertiliser.



In the flow chart, what are W, X, Y and Z?

	W	X	Y	Z
A	H_2	N_2	high	NH_3
B	O_2	SO_2	high	SO_3
C	O_2	SO_2	low	SO_3
D	N_2	H_2	high	NH_3

29 The table gives the melting points, densities and electrical conductivities of four elements.

Which element is copper?

	melting point in °C	density in g / cm^3	electrical conductivity
A	–38.9	13.6	good
B	–7.2	3.12	poor
C	97.8	0.97	good
D	1083	8.96	good

30 Which gases are all present at the positive electrode during the manufacture of aluminium?

A CO, H_2, CO_2

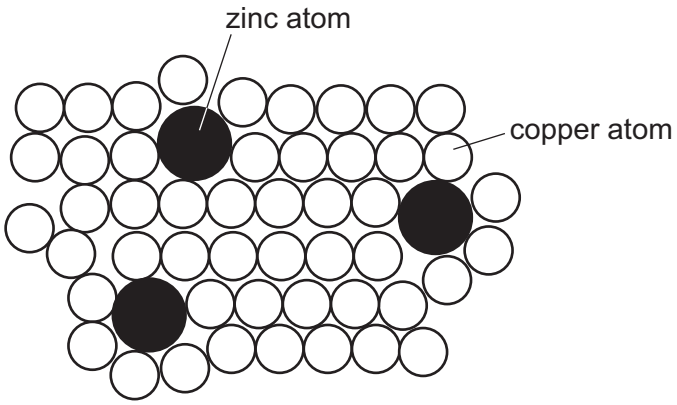
B CO, SO_2, H_2O

C O_2, CO, CO_2

D SO_2, H_2, O_2

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31 The diagram shows the structure of brass.



Why is brass harder than pure copper?

A The zinc atoms form strong covalent bonds with copper atoms.

B The zinc atoms prevent layers of copper atoms from sliding over each other easily.

C The zinc atoms prevent the 'sea of electrons' from moving freely in the solid.

D Zinc atoms have more electrons than copper atoms.

32 Which pollutant causes eutrophication in rivers?

A acid rain

B carbon monoxide

C fertiliser

D metal compounds

33 How many moles of hydrogen chloride are formed when one mole of methane reacts with a large excess of chlorine in sunlight?

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

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34 Which statements about alcohols are correct?

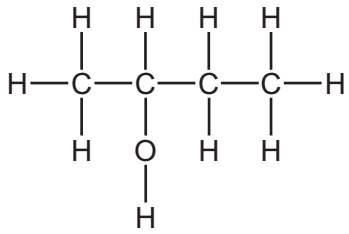
1 All alcohols contain the hydroxide ion, OH^-.

2 Ethanol can be formed from ethene using a reaction catalysed by yeast.

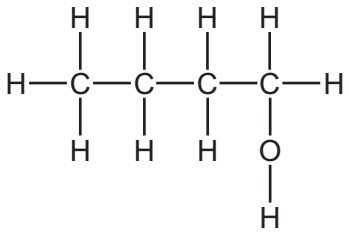
3 Methanol can be oxidised to methanoic acid.

4 The alcohols X and Y shown are isomers.

X



Y



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

35 Amino acids are essential building blocks in the human body. Macromolecules in food are hydrolysed to form amino acids.

Which macromolecules provide the body with amino acids?

A carbohydrates

B fats

C proteins

D sugars

36 Ethanol, C_2H_6O, was reacted with propanoic acid, $C_3H_6O_2$, in the presence of concentrated sulfuric acid.

Which statement about the organic product of this reaction is correct?

A It has the formula $C_5H_{10}O_2$.

B It has the formula $C_5H_{12}O_3$.

C It is formed by an addition reaction.

D It is propyl ethanoate.

37 How can alkenes be manufactured?

A by polymerisation reactions

B by the addition of hydrogen to unsaturated vegetable oils

C by the combustion of alkanes

D by the cracking of hydrocarbons

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38 Which statement about alkanes is correct?

A Ethane reacts with chlorine in an addition reaction.

B Propane has a higher boiling point than butane.

C The molecule of the alkane that contains 99 carbon atoms has 200 hydrogen atoms.

D There are three isomers with the formula C_4H_{10}.

39 Which statement about ethanoic acid is correct?

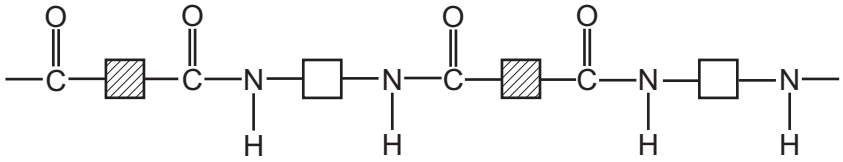
A Ethanoic acid can be made by the catalysed addition of steam to ethene.

B Propanoic acid can react with ethanoic acid to produce an ester.

C Solutions of $1.0\,mol/dm^3$ ethanoic acid and $1.0\,mol/dm^3$ hydrochloric acid will react with magnesium at equal rates.

D The formula of ethanoic acid is CH_3CO_2H.

40 Polymer Z has the structure shown.



These four terms can be used to describe polymers.

1 addition polymer

2 condensation polymer

3 polyamide

4 polyester

Which two terms can be applied to polymer Z?

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

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The Periodic Table of Elements

Group																	
I	II											III	IV	V	VI	VII	VIII
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
11 Na sodium 23	12 Mg magnesium 24											13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	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 –	89–103 actinoids	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 –		114 Fl flerovium –		116 Lv livermorium –		

Key

atomic number
atomic symbol
name
relative atomic mass

lanthanoids	57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium –	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
actinoids	89 Ac actinium –	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium –	94 Pu plutonium –	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 –

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