TANJONG KATONG GIRLS' SCHOOL
PRELIMINARY EXAMINATION
SECONDARY FOUR EXPRESS
CHEMISTRY

CANDIDATE NAME							
CLASS	4			INDEX NUMBER			

CHEMISTRY

6092/01

Paper 1 Multiple Choice

22 August 2025

1 hour

Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.
Write your name, Centre number and index number on the Answer Sheet in the spaces provided unless this has been done for you.
Do **NOT** WRITE on ANY BARCODES.

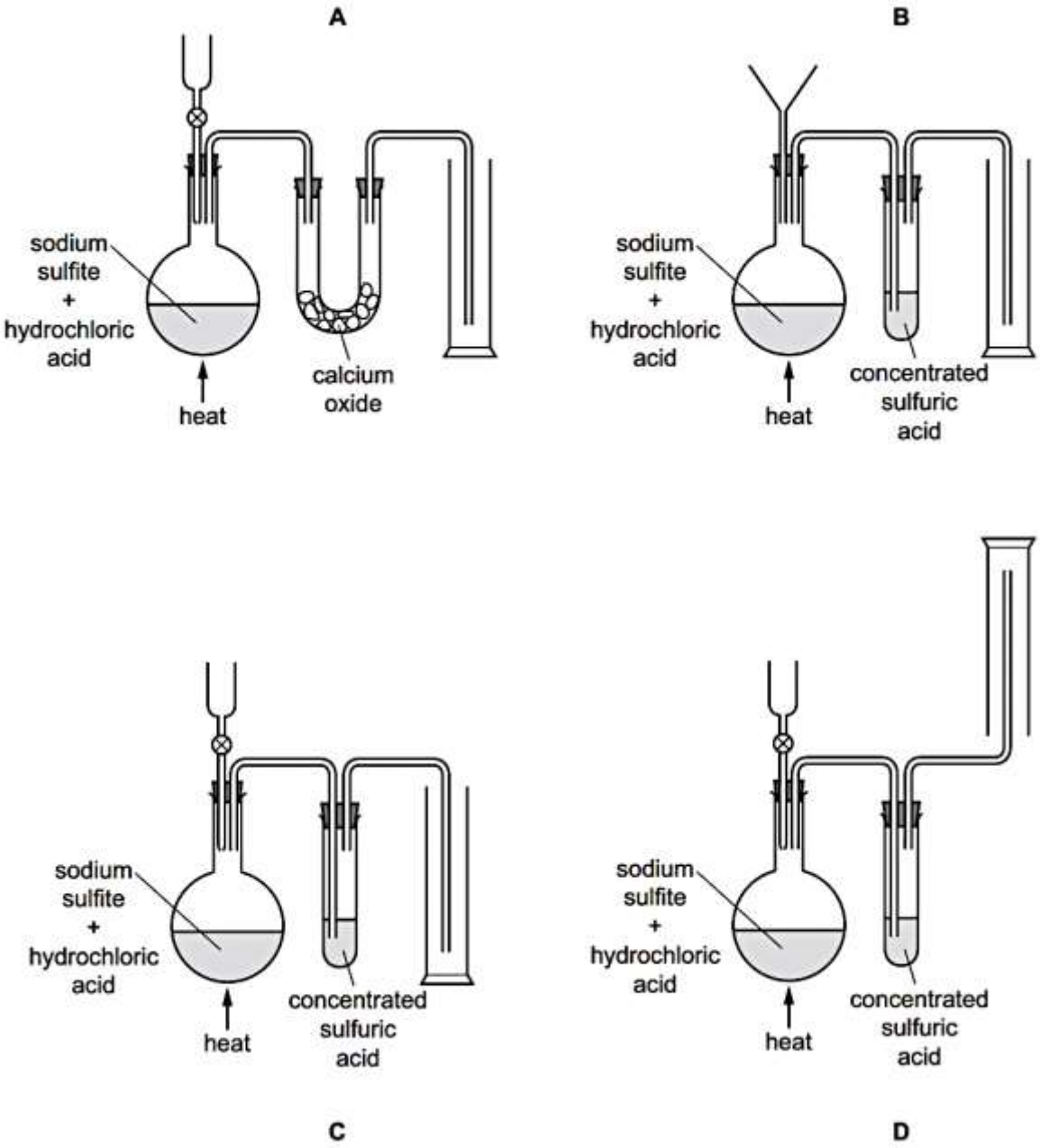
There are **forty** questions in this paper. Answer **all** questions. For each question, there are four possible answers **A**, **B**, **C** and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

Read 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 18.
The use of an approved scientific calculator is expected, where appropriate.

Downloaded from SingaKids.com

1 Sulfur dioxide gas can be prepared by heating sodium sulfite with hydrochloric acid. Which set of apparatus is suitable for preparing and collecting a dry sample of sulfur dioxide?



2 A student wants to separate a mixture of iodine and sodium chloride. Which method should she use?

A Crystallisation

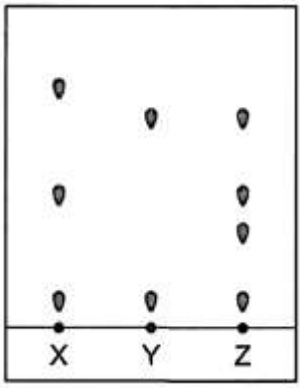
B Sublimation

C Filtration

D Distillation

Downloaded from SingaKids.com

3 **X**, **Y** and **Z** are all mixture of alcohols. A paper chromatogram is obtained for samples of **X**, **Y** and **Z**.



Which row is correct?

	statement 1	statement 2
A	**Z** contains no more than four alcohols	**X**, **Y** and **Z** could contain the same alcohol
B	**Z** contains no more than four alcohols	**X**, **Y** and **Z** could not contain the same alcohol
C	**Z** contains at least four alcohols	**X**, **Y** and **Z** could contain the same alcohol
D	**Z** contains at least four alcohols	**X**, **Y** and **Z** could not contain the same alcohol

4 What happens as ice melts at 0ºC?

1 Molecules gain kinetic energy and temperature increases.

2 Energy is gained to overcome the intermolecular forces of attraction.

3 Molecules gain sufficient energy to move from fixed positions.

A 1 only

B 1 and 2 only

C 1 and 3 only

D 2 and 3 only

Downloaded from SingaKids.com

5 Which gas diffuses most rapidly under the same conditions of temperature and pressure?

A Cl_2 **B** CO_2

C CH_4 **D** NO_2

6 Which statement about electrons, neutrons and protons is correct?

A The relative charge of a proton is equal but opposite in sign to the relative charge of an electron.

B The relative charge of a proton is the same as the relative charge of a neutron.

C The relative mass of an electron is about 2000 times the relative mass of a neutron.

D The relative masses of protons and electrons are the same.

7 Which statement about isotopes is correct?

A They have different numbers of electrons and react differently in chemical reactions.

B They have the same number of neutrons and exhibit identical chemical and physical properties.

C They have different mass numbers but undergo the same chemical reactions.

D They have different proton numbers and belong to different elements.

Downloaded from SingaKids.com

8 The table shows the number of subatomic particles in different atoms or ions.

	number of neutrons	number of protons	number of electrons
W	12	12	10
X	13	12	12
Y	16	15	18
Z	18	17	18

Which statements about **W**, **X**, **Y** and **Z** are correct?

1 **W** has a charge of 2–.

2 **W** and **Y** form $\mathbf{W_2Y_3}$.

3 $\mathbf{WZ_2}$ has a giant ionic structure.

A 1 and 2 only **B** 1 and 3 only

C 2 and 3 only **D** 3 only

9 Which structure corresponds to its description of physical properties?

	structure	physical properties
1	giant covalent	high melting point, conducts electricity when in solution but not when solid
2	simple molecular	low melting point, does not conduct electricity in any state
3	giant metallic	variety of melting points, conducts electricity when solid and when molten

A 1 and 2 only **B** 1 and 3 only

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

Downloaded from SingaKids.com

10 Nitric acid reacts with a wide range of elements and compounds.

$$P_4 + \mathbf{a}HNO_3 \rightarrow 4H_3PO_4 + 4H_2O + 20NO_2$$

What is the value of **a** in the correctly balanced equation?

A 5 **B** 10

C 15 **D** 20

11 Which **two** pieces of information are most essential to calculate the relative molecular mass of a compound?

A the empirical formula and the relative atomic masses of the elements in the compound

B the empirical formula and the total number of atoms of each element in the compound

C the molecular formula and the percentage by mass of each element in the compound

D the molecular formula and the relative atomic masses of the elements in the compound

12 Copper, in the form of $CuFeS_2$, is extracted from ores in copper mines. The ore contains only 1% by mass of copper.

What percentage of the ore contains $CuFeS_2$, if it is the only copper-containing compound present?

A 1.00% **B** 2.88% **C** 3.47% **D** 34.70%

13 Boron carbide contains boron and carbon. A sample contains 0.78 g of boron and 0.22 g of carbon.

What is the empirical formula of boron carbide?

A BC_2 **B** BC_4 **C** B_2C **D** B_4C

Downloaded from SingaKids.com

14 An element forms a diatomic molecule, **Q**, which has a relative molecular mass, x. The Avogadro constant is L.

How many atoms are present in 1.0 g of **Q**?

A $\frac{L}{x}$ **B** $\frac{2L}{x}$ **C** $\frac{L}{2x}$ **D** $2LX$

15 A farmer tests the soil and finds it has a pH of 4.5. Which substance should she add to correct the pH?

A ammonium sulfate

B calcium hydroxide

C sulfur dioxide

D potassium nitrate

16 Which oxides react with aqueous sodium hydroxide?

1 copper(II) oxide

2 carbon dioxide

3 zinc oxide

A 2 only **B** 3 only

C 1 and 3 only **D** 2 and 3 only

17 A salt can be prepared by adding an excess of solid **X** to an aqueous solution of **Y**. A solution and some solid **X** remain.

The mixture is filtered. The filtrate is evaporated to form a concentrated solution, which is left to crystallise. Excess solution is poured off, leaving salt **Z**.

Which salt can be safely prepared using this method?

A ammonium chloride

B copper(II) sulfate

C barium sulfate

D potassium chloride

Downloaded from SingaKids.com

18 Which statement about the Haber process for the manufacture of ammonia is correct?

A At higher temperatures, the yield increases and the rate of production of ammonia is faster.

B At higher pressure, the yield increases and the rate of production of ammonia is faster.

C In the presence of a catalyst, the yield decreases but the rate of production of ammonia is faster.

D In the presence of a catalyst, the yield increases and the rate of production of ammonia is faster.

19 Filings of an alloy containing zinc and aluminium reacted with dilute hydrochloric acid to form a solution. Excess aqueous ammonia was added to the solution with shaking. The outcome was recorded.

Which statement correctly describes the outcome?

A A white precipitate is seen due to $Al(OH)_3$.

B A white precipitate is seen due to $Zn(OH)_2$.

C A white precipitate is seen due to a mixture of $Al(OH)_3$ and $Zn(OH)_2$.

D A colourless solution with no precipitate is seen as the precipitate dissolved.

20 **J** is an aqueous solution.

On addition of aqueous sodium hydroxide to **J**, a green precipitate is formed. The resulting mixture is heated and no gas is formed.

Aluminium foil is added to the warmed mixture. A gas is formed that turns damp red litmus paper blue.

Which ions could be present in **J**?

A Fe^{2+} and NO_3^- **B** Fe^{2+} and NH_4^+

C Fe^{3+} and NO_3^- **D** Fe^{3+} and NH_4^+

Downloaded from SingaKids.com

21 What happens during the purifying of copper by electrolysis?

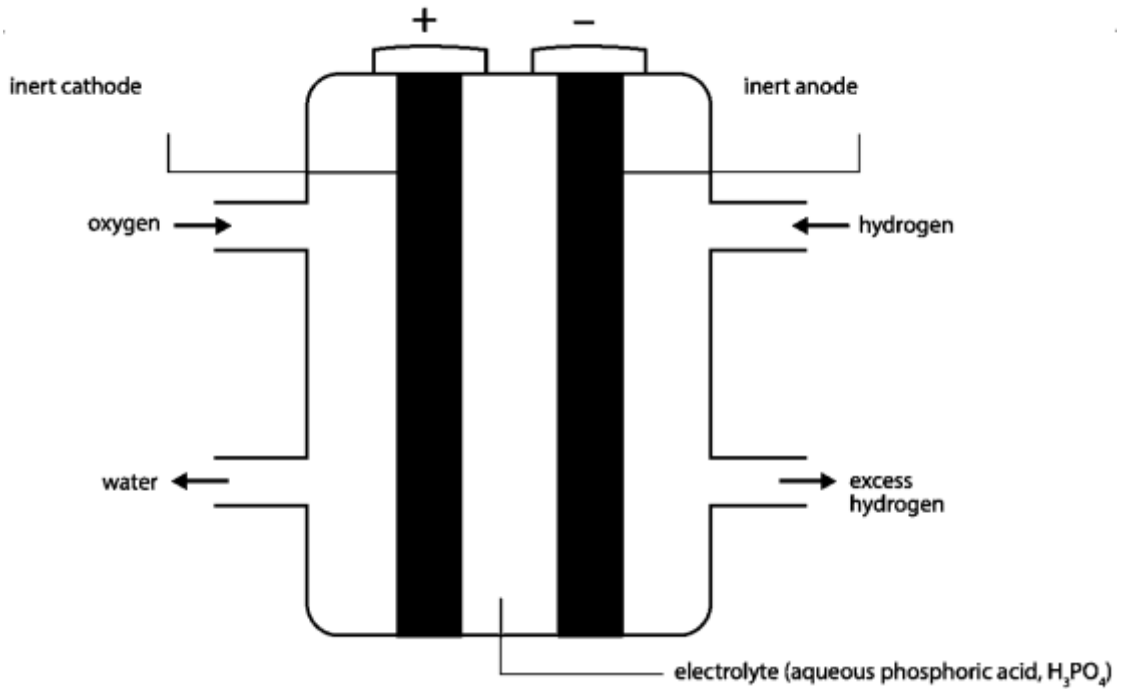
A Copper is removed from the anode and deposited at the cathode. The solution remains blue.

B Copper is deposited on the negative electrode and the solution becomes colourless.

C The solution becomes increasingly blue as more copper ions are formed at the positive electrode.

D Copper is transferred from the solution to the anode and the solution becomes colourless.

22 The diagram shows a hydrogen-oxygen fuel cell.



What are the changes in the pH of the solution around each of the electrode when a current is flowing?

	cathode	anode
A	increase	increase
B	decrease	decrease
C	decrease	increase
D	increase	decrease

Downloaded from SingaKids.com

23 Three aqueous solutions are electrolysed using inert electrodes.

1 dilute aqueous sodium chloride

2 concentrated aqueous sodium bromide

3 dilute aqueous sodium sulfate

What are the gases produced at the anode for each solution?

	gas formed at anode for solution 1	gas formed at anode for solution 2	gas formed at anode for solution 3
A	oxygen	bromine	oxygen
B	chlorine	bromine	sulfur dioxide
C	oxygen	oxygen	sulfur dioxide
D	chlorine	oxygen	oxygen

24 Which species are from the same group of the Periodic Table?

1 an atom with the electronic configuration of 2, 3

2 an atom with the electronic configuration of 2, 8, 3

3 an ion with a 3– charge and an electronic configuration of 2, 8, 8

A 1 and 3 only **B** 1 and 2 only

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

25 Indium, $^{115}_{49}In$, is used in solar cells and transistors, and to coat high-speed bearings.

From its position in the Periodic Table, which properties will indium be expected to possess?

1 It forms a chloride with the formula $InCl_3$.

2 Its oxide neutralises nitric acid.

3 Its chloride forms coloured solutions.

A 1 and 2 only **B** 1 and 3 only

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

Downloaded from SingaKids.com

26 Properties of an element and its compounds can be predicted from the position of the element in the Periodic Table.

Which property could **not** be predicted in this way?

A The acidic or basic nature of its oxide.

B The number of valence electrons in its atoms.

C The number of isotopes it has.

D The reactivity of the element.

27 Rubidium is a Group 1 metal located below potassium in the Periodic Table.

Which statement is correct?

A Rubidium is less dense than potassium.

B Rubidium has a higher melting point than potassium.

C Rubidium reacts more explosively with water than potassium.

D Rubidium chloride is insoluble while potassium chloride is soluble.

28 Which deduction about the element astatine, At, can be made from its position in Group 17?

A It is a gas.

B It is more reactive than iodine.

C It forms covalent compounds with sodium.

D It is displaced from aqueous potassium astatide, KAt, by chlorine.

Downloaded from SingaKids.com

29 Iron and copper are widely used as industrial catalysts.

Which statement explains why this is so?

A Their compounds have low melting points and are easily decomposed.

B They form ions with variable oxidation states that can participate in redox reactions.

C They are in the same group of the Periodic Table and react readily with acids.

D They are coloured metals that do not form oxides easily.

30 Why is argon commonly used to fill electric light bulbs to prolong the life of the wire filament?

A Argon is a dense air that cools the filament rapidly.

B Argon conducts electricity and increases the efficiency of the filament.

C Argon is chemically unreactive and prevents oxidation of the filament.

D Argon reacts with oxygen, forming a protective oxide coating.

31 A metal oxide cannot be reduced by either carbon or hydrogen.

Which statement is correct?

A The metal is more reactive than carbon and hydrogen and must be extracted by electrolysis.

B The metal is less reactive than carbon and can be extracted by heating with carbon.

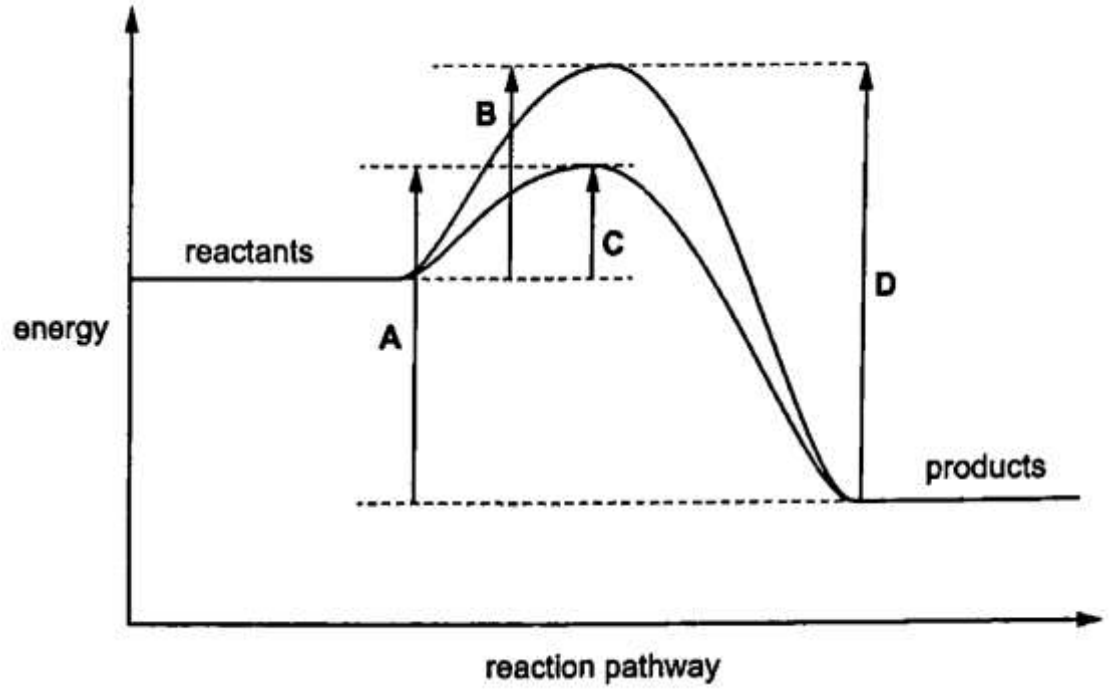
C The metal is less reactive than hydrogen and can be found uncombined in nature.

D The metal is more reactive than hydrogen but less reactive than carbon, so should be reduced using hydrogen.

Downloaded from SingaKids.com

32 When 7.0 g of **Q** is added to a mixture of reactants, the rate of reaction increases. At the end of the reaction, 7.0 g of **Q** is still present in the mixture.

Which energy change represents the activation energy of the reaction when **Q** is added?



33 The enthalpy change of the decomposition of nitrogen(II) oxide, NO, is –180kJ/mol.

$$2NO(g) \rightarrow N_2(g) + O_2(g)$$

What is the enthalpy change of the reaction shown?

$$4NO(g) \rightarrow 2N_2(g) + 2O_2(g)$$

A –360kJ **B** –180kJ **C** +180kJ **D** +360kJ

Downloaded from SingaKids.com

34 The table shows information about two fractions obtained from the fractional distillation of crude oil.

fraction	average number of carbon atoms	collection point in column
petrol	5 – 9	near the top
diesel	14 – 20	lower than petrol

Which statement explains why petrol is collected nearer the top of the column than diesel?

A Petrol contains smaller molecules, so its intermolecular forces of attraction are weaker, and it condenses at lower temperature.

B Petrol is more flammable than diesel, so it separates at a higher temperature.

C Diesel has stronger covalent bonds, which increases its boiling points.

D Diesel contains more carbon atoms, so it rises higher in the column before condensing.

35 Alkenes can be produced by the cracking of alkanes, such as decane, $C_{10}H_{22}$.

Which equation correctly shows the cracking of decane to produce two different alkenes and at least one other product?

A $C_{10}H_{22} \rightarrow 2C_2H_4 + C_3H_6 + C_4H_{10}$

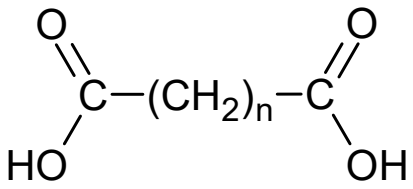
B $C_{10}H_{22} \rightarrow H_2 + 2C_2H_4 + C_3H_6 + C_5H_{10}$

C $C_{10}H_{22} \rightarrow 2C_3H_6 + C_4H_{10}$

D $C_{10}H_{22} \rightarrow H_2 + 2C_2H_4 + 2C_3H_6$

Downloaded from SingaKids.com

36 The setting agent used in the manufacture of chocolate mousse is an organic acid. It has a relative molecular mass of 146.



How many carbon atoms are there in one molecule of this organic acid?

A 4 **B** 5 **C** 6 **D** 7

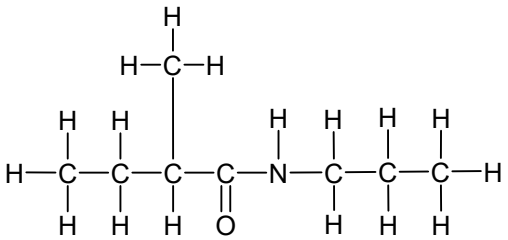
37 In which compounds are the empirical and molecular formulae different?

1 ethanoic acid
2 ethyl ethanoate
3 propane

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

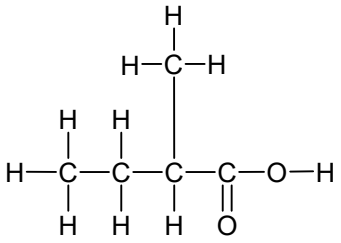
Downloaded from SingaKids.com

38 An amide has the following structure.

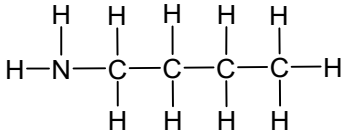


Which two compounds will react to form this amide?

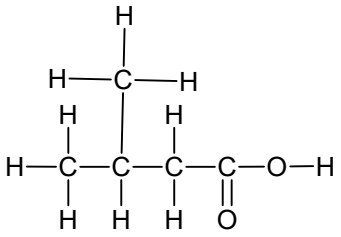
1



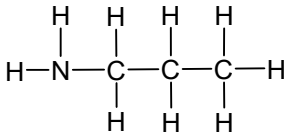
2



3



4



A 1 and 4

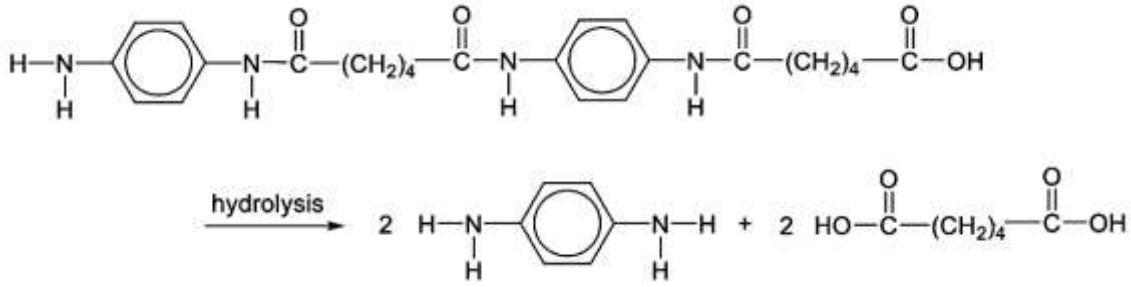
B 2 and 3

C 1 and 2

D 3 and 4

Downloaded from SingaKids.com

39 A polyamide **S** is hydrolysed as shown.



Another polyamide **T** is hydrolysed using the same method.

The equation is shown.

$$\mathbf{T} \rightarrow 10\ H_2N(CH_2)_6NH_2 + 10\ HOOC(CH_2)_4COOH$$
$$(M_r = 116) \qquad (M_r = 146)$$

What is the M_r of **T**?

A 2260 **B** 2278 **C** 2440 **D** 2620

40 Which list shows typical uses of man-made fibres?

A cling film, fishing line, parachutes

B cling film, clothing, sleeping bags

C fishing line, plastic bags, sleeping bags

D clothing, fishing line, parachutes

Downloaded from SingaKids.com

The Periodic Table of Elements

Group																	
1	2											13	14	15	16	17	18
							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	3	4	5	6	7	8	9	10	11	12	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

proton (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 18	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.).
The Avogadro constant, L = 6.02 x 10^{23} mol^{-1}

Downloaded from SingaKids.com

Downloaded from SingaKids.com