



**TANJONG KATONG GIRLS' SCHOOL
PRELIMINARY EXAMINATION
SECONDARY FOUR EXPRESS**

CANDIDATE
NAME

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CLASS

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INDEX
NUMBER

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SCIENCE (CHEMISTRY)

5086/01 & 5088/01

Paper 1 Multiple Choice

22 August 2025

1 hour

Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Write your name, index number on the Answer Sheet.

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 Data Sheet is printed on page 9.

A copy of the Periodic Table is printed on page 10.

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

- 1 A student intends to measure the rate of reaction between a volume of hydrochloric acid and a lump of zinc carbonate.



Which piece of apparatus is required to perform the experiment?

- A** distillation flask
B gas syringe
C test-tube
D thermometer
- 2 Which statement explains why carbon dioxide and oxygen can be separated from air by fractional distillation?
- A** Carbon dioxide has a larger molecular mass than oxygen.
B Carbon dioxide is a triatomic molecule while oxygen is a diatomic molecule.
C Carbon dioxide and oxygen have different boiling points.
D Carbon dioxide is less soluble in water than oxygen.
- 3 An element **G** forms a compound with nitrogen with a chemical formula of **GN**. Given that **G** has 56 particles in the nucleus, which row shows the correct composition of an ion of **G**?

	number of protons	number of neutrons	number of electrons
A	26	30	23
B	26	30	26
C	30	26	26
D	30	26	23

- 4 Which element burns in excess oxygen to form a neutral oxide?
- A** carbon
B hydrogen
C magnesium
D sulfur

- 5 Helium is represented by ${}_{10}^{20}\text{Ne}$.

What can be deduced about neon?

- A** It exists as diatomic molecules.
B It forms a positive ion.
C It has 10 protons and 10 neutrons.
D It has a nucleon mass of 30.
- 6 Which substance has the typical properties of a covalent compound?

	melting point / °C	boiling point / °C	electrical conductivity at room temperature
A	-39	361	conductor
B	-21	105	non-conductor
C	636	1300	conductor
D	3727	4829	non-conductor

- 7 Steel is widely used in construction because of its strength and hardness as compared to pure iron.

Which statement explains why steel is used over pure iron?

- A** Carbon atoms form covalent bonds with iron atoms.
B Carbon atoms disrupt the regular arrangement of iron atoms.
C Steel has lower density than iron.
D Carbon anions form strong electrostatic forces of attraction with iron cations.

8 A metallic element, **M**, has the following properties:

- less dense than water
- easily cut by a knife
- melts below 100 °C
- **M** reacts with water to form a soluble hydroxide.

What is **M**?

- A** barium
- B** copper
- C** magnesium
- D** potassium

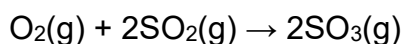
9 Excess aqueous sodium hydroxide is added to salt **P** and the solution is heated. A gas is given off which turns red litmus blue.

When this reaction is complete, aluminium foil is added to the solution. A gas is again given off which also turns red litmus blue.

What is salt **P**?

- A** ammonium nitrate
- B** ammonium sulfate
- C** zinc nitrate
- D** zinc sulfate

10 40 cm³ of oxygen was reacted with 20 cm³ of sulfur dioxide to form sulfur trioxide.



What are the volume of gases remaining at the end of reaction at room temperature and pressure?

	Volume of oxygen / cm ³	Volume of sulfur dioxide / cm ³	Volume of sulfur trioxide / cm ³
A	10	0	20
B	10	0	40
C	30	0	20
D	30	0	40

11 Which substance contains the same number of atoms as 18 g of H₂O?

- A** 1 g of H₂ gas
- B** 12 g of Mg
- C** 44 g of CO₂
- D** 28 g of N₂

12 The table gives information about the reactivity of three metals **S**, **T** and **U**.

metal	reaction with Fe ²⁺ (aq)	reaction with Cu ²⁺ (aq)
S	solution remains green	solution turns colourless
T	solution remains green	solution remains blue
U	solution turns colourless	solution turns colourless

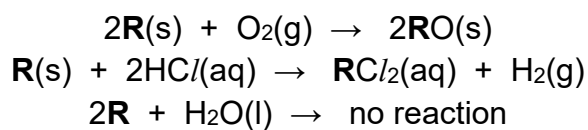
What is the order of reactivity of the metals?

	most reactive —————→ least reactive				
A	S	Fe	T	Cu	U
B	T	Fe	S	Cu	U
C	U	Fe	S	T	Cu
D	U	Fe	S	Cu	T

13 In an endothermic reaction, what happens to the bonds in the reactants compared to the products?

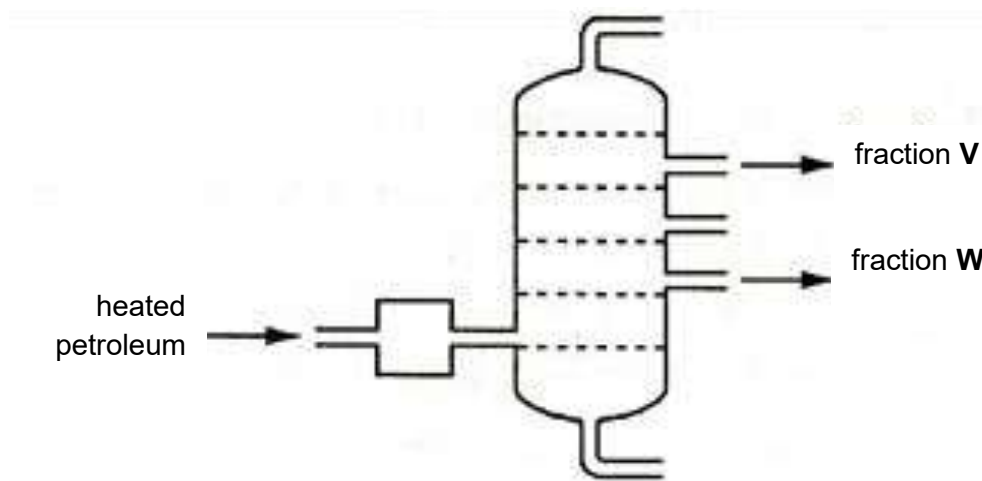
- A** Energy is released when stronger bonds form in the products.
- B** Energy is absorbed when weaker bonds form in the products.
- C** Energy is absorbed to break bonds in the reactants.
- D** Energy is released to break bonds in the reactants.

- 14 An element **R** reacts in the following ways.



Which one of the following could be **R**?

- A calcium
 - B copper
 - C sodium
 - D zinc
- 15 The diagram shows the fractional distillation of petroleum.



Which statement about fractions **V** and **W** is correct?

- A Fraction **V** combusts less easily than fraction **W**.
- B Fraction **V** has a higher density than fraction **W**.
- C Fraction **V** has a lower boiling point than fraction **W**.
- D Fraction **V** is more viscous than fraction **W**.

16 How can margarine be made from vegetable oils?

- A** addition of hydrogen to a saturated oil in the presence of nickel catalyst
- B** addition of hydrogen to an unsaturated oil in the presence of nickel catalyst
- C** addition of steam to a saturated oil in the presence of nickel catalyst
- D** addition of steam to an unsaturated oil in the presence of nickel catalyst

17 The following are three reactions of hydrocarbons.



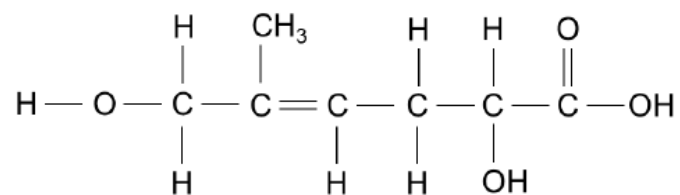
Which row describes the three reactions correctly?

	Reaction 1	Reaction 2	Reaction 3
A	combustion	addition	cracking
B	substitution	cracking	combustion
C	addition	combustion	cracking
D	reduction	addition	combustion

18 Which environmental problem is associated with non-biodegradable plastics?

- A** increased soil fertility
- B** ocean acidification
- C** pollution in landfills and marine environments
- D** depletion of mineral resources

19 The structure of an organic compound is shown.



Which statement about the above compound is correct?

- 1 It decolourises aqueous bromine.
- 2 It can undergo addition polymerisation.
- 3 It can undergo oxidation with acidified potassium manganate(VII).
- 4 It can react with metal carbonates.

- A** 1 and 2 only
B 1 and 3 only
C 2, 3 and 4 only
D All of the above

20 A forested region was cleared, and the trees were burned to make way for development. Which combination of effects on the carbon cycle is *most likely* to occur as a **long-term** consequence?

- A** increase in photosynthesis and decrease in ocean uptake
B decrease in photosynthesis and increase in atmospheric carbon dioxide
C increase in combustion and increase in photosynthesis
D decrease in combustion and increase in oxygen production

Colours of Some Common Metal Hydroxides

calcium hydroxide	white
copper(II) hydroxide	light blue
iron(II) hydroxide	green
iron(III) hydroxide	red brown
zinc hydroxide	white

Group																	
1	2	Key					13	14	15	16	17	18					
		proton (atomic) number atomic symbol name relative atomic mass		1 H hydrogen 1													
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 actinoids	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	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 Mc moscovium -	116 Lv livermorium -	117 Ts tennessine -	118 Og oganesson -

of,