CHUA CHU KANG SECONDARY SCHOOL

O LEVEL PRELIMINARY EXAMINATION 2024
Secondary Four Express

Marks: **40**

CANDIDATE NAME			
CLASS		INDEX NUMBER	

SCIENCE (CHEMISTRY, BIOLOGY) **5088/01**

Paper 1 Multiple Choice **30 August 2024**

Additional Materials: Multiple Choice Answer Sheet (OAS) **1 hour**

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.
Write your name, index number and class on the Answer Sheet in the spaces provided.

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 on this paper.
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.

This document consists of **10** printed pages.

Setter: Mrs Trina Wong
Vetter: Ms Ang Jia Wei

[Turn over

1 A titration is carried out to measure the volume of hydrochloric acid needed to neutralise aqueous sodium hydroxide.

Exactly 25.0 cm^3 of aqueous sodium hydroxide is measured out into a conical flask and the hydrochloric acid is added drop by drop.

Which apparatus is used during this experiment?

	aqueous sodium hydroxide	hydrochloric acid
A	burette	pipette
B	measuring cylinder	burette
C	pipette	burette
D	pipette	measuring cylinder

2 A colourless solution P is tested separately with aqueous sodium hydroxide and with aqueous silver nitrate acidified with nitric acid.

The results are shown.

test	aqueous sodium hydroxide	aqueous silver nitrate acidified with nitric acid
result	white precipitate insoluble in excess	white precipitate

What is P?

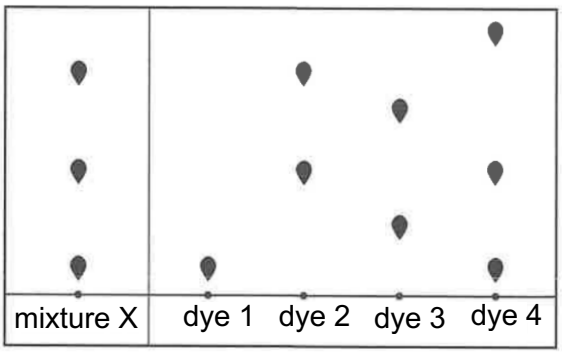
A calcium chloride

B calcium sulfate

C zinc chloride

D zinc sulfate

3 Paper chromatography is carried out on a mixture X and four individual dyes using the same solvent.



Which dyes does mixture X contain?

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

4 Which statement about isotopes of the same element is correct?

A They have different numbers of electrons but the same number of protons.

B They have different numbers of electron shells but the same number of neutrons.

C They have different numbers of neutrons but the same number of electron shells.

D They have different numbers of protons but the same number of electrons.

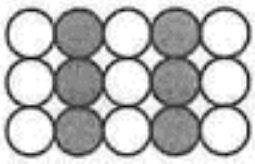
5 Elements X and Y react to form a compound.
Element X loses two electrons and element Y gains one electron.

What is the charge on the ions of elements X and Y and what is the formula of the compound?

	charge on ion of X	charge on ion of Y	formula of compound
A	2+	1−	X_2Y
B	2+	1−	XY_2
C	2−	1+	X_2Y
D	2−	1+	XY_2

6 Which diagram shows the arrangement of the atoms in stainless steel?

A



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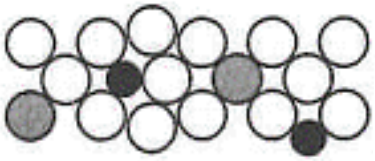

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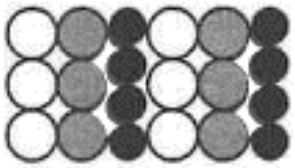

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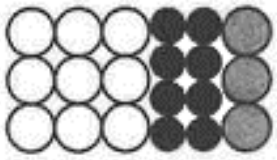


key

○ = iron atom

● = chromium atom

● = carbon atom

7 What is the relative formula mass of $Mg(OH)_2$?

A 21 **B** 30 **C** 42 **D** 58

8 20 cm^3 of ethene are reacted with 70 cm^3 of oxygen.

The equation for the reaction is shown.

$$C_2H_4\,(g) + 3O_2(g) \rightarrow 2CO_2\,(g) + 2H_2O\,(l)$$

All the volumes are measured at room temperature and pressure.

What is the **total** volume of gas remaining at the end of the reaction?

A 40 cm^3 **B** 50 cm^3 **C** 80 cm^3 **D** 90 cm^3

9 Solutions of two chemicals are mixed in a beaker.

A reaction occurred and a decrease in surrounding temperature is observed.

Which statement is correct?

A An endothermic reaction occurs and the reacting chemicals gain energy.

B An endothermic reaction occurs and the reacting chemicals lose energy.

C An exothermic reaction occurs and the reacting chemicals gain energy.

D An exothermic reaction occurs and the reacting chemicals lose energy.

10 Hydrogen reacts with iodine to form hydrogen iodide.

$$H_2\,(g) + I_2\,(g) \rightarrow 2HI\,(g)$$

1 At higher pressure, the molecules gain heat energy and move faster.

2 At higher pressure, the molecules are closer together to one another.

3 At higher pressure, the molecules collide more frequently and effectively.

Which statements explain why the reaction is faster when the pressure is increased, at constant temperature?

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

11 Which change represents oxidation?

A $Cl_2 \rightarrow 2Cl^-$

B $CuO \rightarrow Cu$

C $Fe^{3+} \rightarrow Fe^{2+}$

D $Zn \rightarrow Zn^{2+}$

12 Zinc oxide is an amphoteric oxide.

Which statement about zinc oxide is correct?

A It will not react with hydrochloric acid but will react with sodium hydroxide.

B It will not react with hydrochloric acid or sodium hydroxide.

C It will react with hydrochloric acid and sodium hydroxide.

D It will react with hydrochloric acid but not sodium hydroxide.

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

A Elements are arranged in order of their nucleon number.

B Elements are arranged in order of their proton number.

C The period number is related to the number of electrons in the outer shell.

D The reactivity of Group 1 elements decreases down the group.

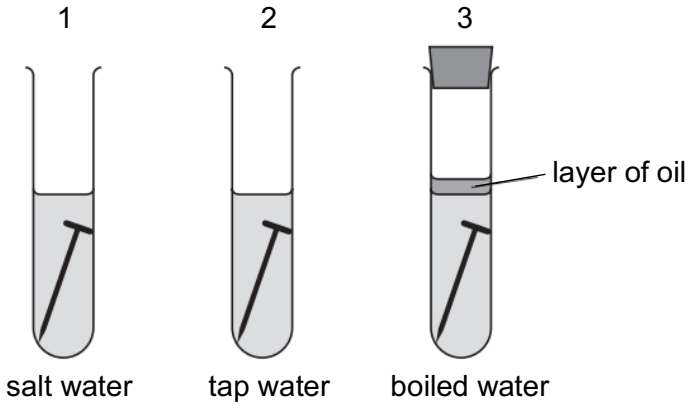
14 The table shows the results of halogen displacement experiments.

halogen added	halide solution		
	X^-	Y^-	Z^-
X_2	–	Y_2 displaced	Z_2 displaced
Y_2	no reaction	–	no reaction
Z_2	no reaction	Y_2 displaced	–

What are halogens X, Y and Z?

	X	Y	Z
A	Br	C*l*	I
B	Br	I	C*l*
C	C*l*	I	Br
D	C*l*	Br	I

15 The diagrams show experiments to investigate rusting of iron nails.



In which test-tubes do the nails rust?

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

16 Which substances react to form hydrogen gas?

1 copper and water

2 magnesium and steam

3 silver and dilute hydrochloric acid

4 zinc and dilute hydrochloric acid

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

17 Some combustion reactions produce pollutant gases.

1 $2CH_4 + 3O_2 \rightarrow 2CO + 4H_2O$

2 $2H_2 + O_2 \rightarrow 2H_2O$

3 $C + O_2 \rightarrow CO_2$

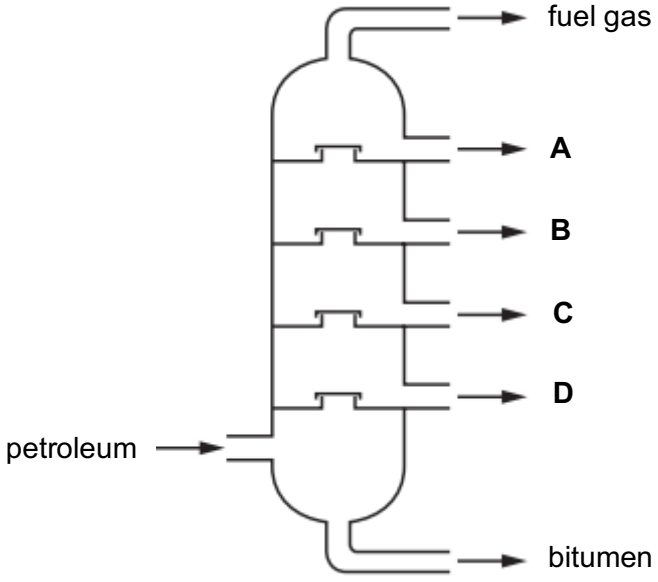
4 $N_2 + O_2 \rightarrow 2NO$

Which reactions produce a pollutant gas that is **not** present in clean air?

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

18 The fractional distillation of petroleum is shown.

Which fraction contains hydrocarbons with the highest number of carbons?



19 In reaction R, 2000 molecules of $CH_2=CH_2$ react to form a single molecule X only.

$$2000CH_2=CH_2 \rightarrow X$$

Which terms describe reaction R, $CH_2=CH_2$ and X correctly?

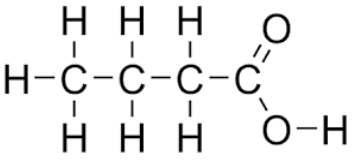
	reaction R	$CH_2=CH_2$	X
A	addition	monomer	polymer
B	addition	polymer	monomer
C	substitution	monomer	polymer
D	substitution	polymer	monomer

20 The results of two tests on compound Z are shown.

test	result
add bromine water	turns colourless
add aqueous sodium carbonate	carbon dioxide formed

Which structure is Z?

A



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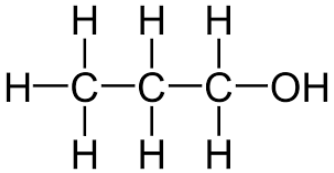

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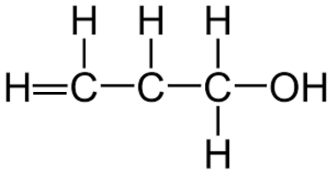

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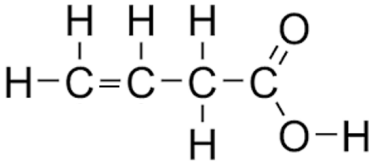

Data Sheet

Colours of Some Common Metal Hydroxides

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

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 –	113 Nh nihonium –	114 Fl flerovium –	115 Mc moscovium –	116 Lv livermorium –	117 Ts tennessine –	118 Og oganesson –

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 –	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, $L = 6.02 \times 10^{23}\ mol^{-1}$