NEW TOWN SECONDARY SCHOOL
Preliminary Examination
Secondary 4 Express / 5 Normal (Academic)

NAME							
CLASS				INDEX NUMBER			

Science (Chemistry)

5076/01, 5078/01

Paper 1 Multiple Choice

30 August 2022

Additional Materials: OTAS

1 hour

1145 – 1245

READ THESE INSTRUCTIONS FIRST

Write your name, register number and class in the spaces provided above.
Write in dark blue or black pen.
Do not use staples, paper clips, glue or correction fluid.

There are **twenty** 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 OTAS.

Read the instructions on the OTAS 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.

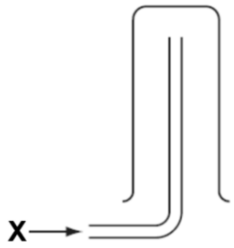
This document consists of **10** printed pages.

Setter: Ms Caley Ng

1 A gas, X, is less dense than air and insoluble in water.

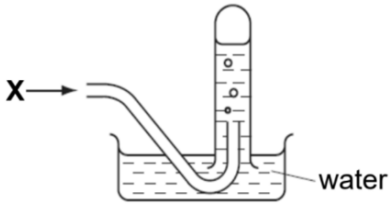
Which is **not** a suitable method to collect the gas?

A

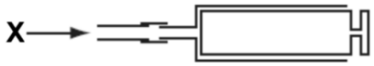


B

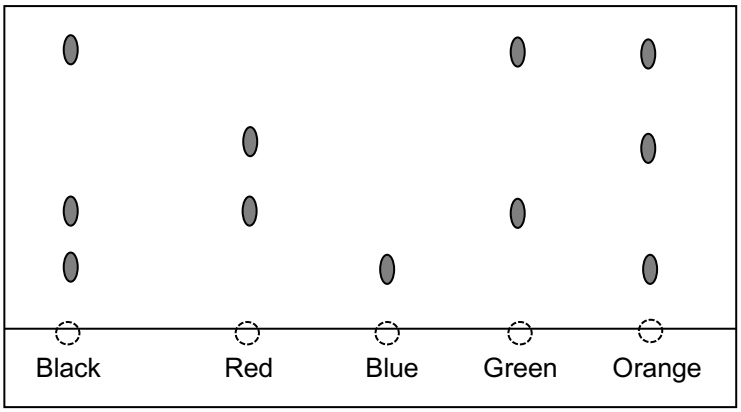
C



D



2 Several inks were analysed using chromatography. The chromatogram is shown below.



Which dyes does the black ink contain?

A blue and green

B green and orange

C red and blue

D red and green

3 Which of the following chemicals could be used to distinguish between aqueous zinc sulfate and aqueous lead(II) nitrate?

1 aqueous barium nitrate solution
2 aqueous ammonia
3 aqueous sodium hydroxide

A 2 only

B 1 and 2 only

C 1 and 3 only

D 1, 2 and 3

4 The formulae of four ions are shown below.

O^{2-} F^{-} Li^{+} Mg^{2+}

Which statement about these ions is correct?

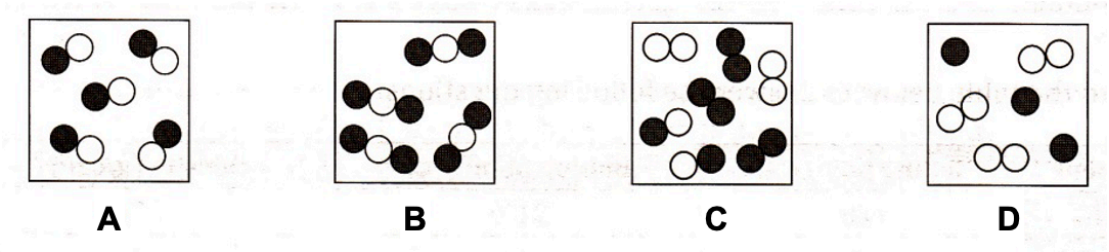
A They all have the same number of protons in their nuclei.

B They all have more electrons than protons.

C They all have the electronic structure of a noble gas.

D They all have the same number of electrons in their outer shells.

5 Which diagram shows a reaction occurring between two elements?



6 Calcium sulfite has the formula, $CaSO_3$.

What is the charge on the sulfite ion?

A 2- **B** 3- **C** 2+ **D** 3+

7 50 cm^3 of ethane is completely burnt in oxygen.

$$2C_2H_6\ (g) + 7O_2\ (g) \rightarrow 4CO_2\ (g) + 6H_2O\ (g)$$

Which volume of oxygen is used in this reaction at room temperature and pressure?

A 50 cm^3

B 100 cm^3

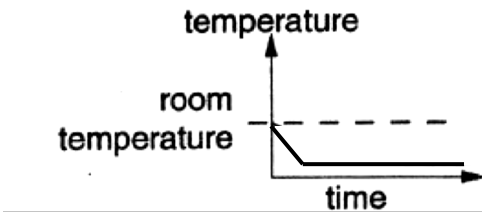
C 175 cm^3

D 350 cm^3

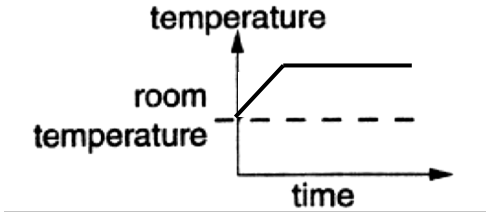
8 The reaction between hydrochloric acid and sodium hydroxide is an exothermic reaction.

Which graph shows the change in temperature of the reaction mixture with time until there is no further change?

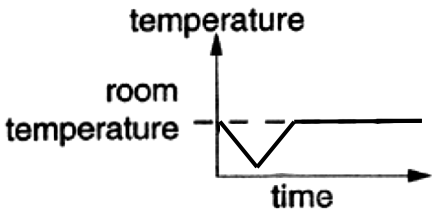
A



B



C



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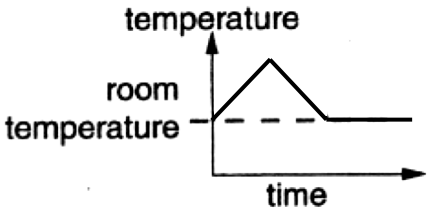


9 Which reaction shows the underlined substance acting as an oxidising agent?

A $2\underline{SO_2} + O_2 \rightarrow 2SO_3$

B $2\underline{AuCl_3} + 3H_2O_2 \rightarrow 2Au + 6HCl + 3O_2$

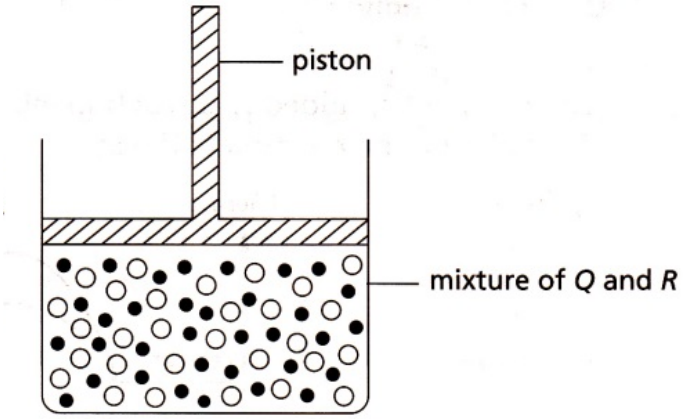
C $Fe_2O_3 + 3\underline{CO} \rightarrow 2Fe + 3CO_2$

D $Cl_2 + 2\underline{KI} \rightarrow 2KCl + I_2$

10 The gases Q and R react according to the equation below:

$$Q\ (g) + R\ (g) \rightarrow T\ (g)$$

The reaction mixture is placed in a container at room temperature as shown in the figure below.



Which of the following actions can speed up the formation of gas T?

A Adding an inert gas into the container.

B Lowering the piston into the container.

C Placing the container into an ice bath.

D Removing part of the reaction mixture from the container, while keeping the volume constant.

11 What is the ionic equation for the reaction between aqueous sodium hydroxide and dilute nitric acid?

A $H^+ + OH^- \rightarrow H_2O$

B $HNO_3 + OH^- \rightarrow H_2O + NO_3^-$

C $Na^+ + NO_3^- \rightarrow NaNO_3$

D $Na^+ + HNO_3 \rightarrow NaNO_3 + H^+$

12 Which row gives the correct classification of the four oxides?

	SO_2	MgO	CO	PbO
A	basic	acidic	acidic	amphoteric
B	basic	amphoteric	acidic	basic
C	acidic	basic	neutral	amphoteric
D	acidic	neutral	neutral	basic

13 Element X is in Group I of the Periodic Table.
Which statement describes the property of X?

A A hard metal with low density

B A soft metal with low density

C A very reactive non-metal

D A non-metal that readily forms X^- ions

14 Metals P, Q, R and S are placed in salt solutions as shown in the table below.

	result of placing metal in solution of			
metal	salt of P	salt of Q	salt of R	salt of S
P		✗	✗	✓
Q	✓		✗	✓
R	✓	✓		✓
S	✗	✗	✗	

key
✓ = reaction observed
✗ = no reaction observed

What is the order of reactivity of the metals, from most reactive to least reactive?

A P, Q, R, S

B P, S, Q, R

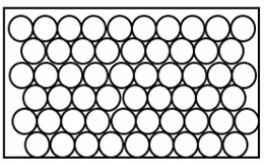
C R, P, S, Q

D R, Q, P, S

15 The diagrams represent different arrangements of atoms.

Which diagram represents an alloy?

A



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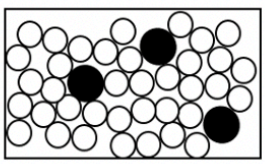
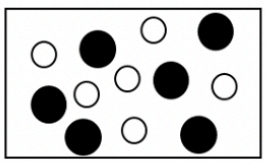


C



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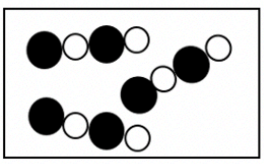


16 Approximately 40% of all iron and steel are produced by recycling.
Three statements about the recycling of metals are listed.

1 Recycling reduces the amount of waste taken to landfill sites.
2 Recycling causes less environmental damage than mining.
3 Iron ore contains a higher percentage of iron than scrap steel.

Which statements are possible reasons for recycling iron?

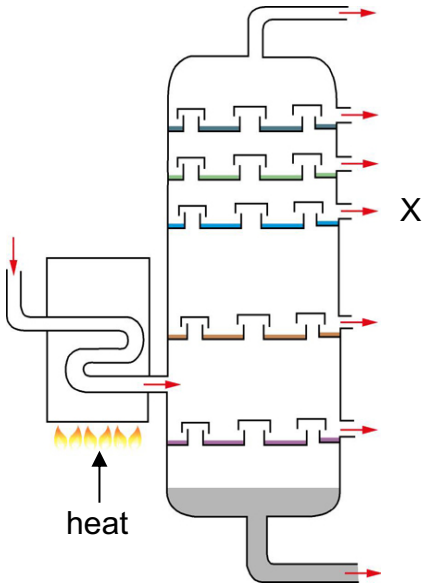
A 1 and 2 only

B 1 and 3 only

C 2 and 3 only

D 1, 2 and 3

17 The diagram shows the fractional distillation of petroleum.



Which statement describes the use of the fraction collected at X?

A It is used as a feedstock for the petrochemical industry.

B It is used as a lubricant for machines.

C It is used as fuel for aircraft.

D It is used as material for surfacing roads.

18 The formulae of three compounds are shown.

C_2H_6 C_4H_8 C_6H_{14}

Which statement about these compounds is correct?

A They have different general formulae.

B Their chemical properties are similar.

C Their physical properties are the same.

D They are members of the same homologous series.

19 Which substance is polyunsaturated?

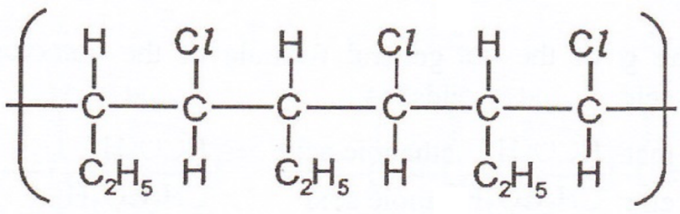
A ethene

B margarine

C poly(ethene)

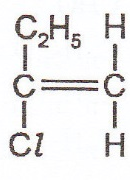
D vegetable oil

20 The diagram shows part of the structural formula of a polymer.



Which monomer is used to make this polymer?

A



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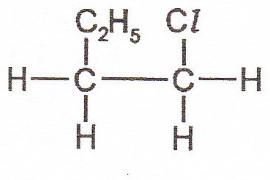

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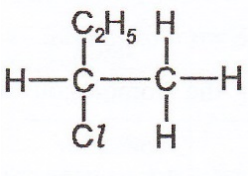

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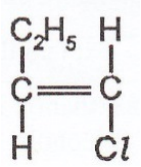

END OF PAPER

DATA SHEET

Colours of Some Common Metal Hydroxides

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

The Periodic Table of Elements

Group																	
I	II											III	IV	V	VI	VII	0
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9		**Key** proton (atomic) number atomic symbol name relative atomic mass									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 –		

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.)