



ST. MARGARET'S SCHOOL (SECONDARY)

End-of-Year Examinations 2024

CANDIDATE NAME

CLASS

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REGISTER NUMBER

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CHEMISTRY

6092/01

Paper 1 Multiple Choice

26 September 2024

Secondary 3 Express

Paper 1 and 2: 2 hours

Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Write your name, class and register number on the cover page in the spaces provided.

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 Multiple Choice Answer Sheet provided.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

The total mark for the paper is 20.

Any rough working should be done in this booklet.

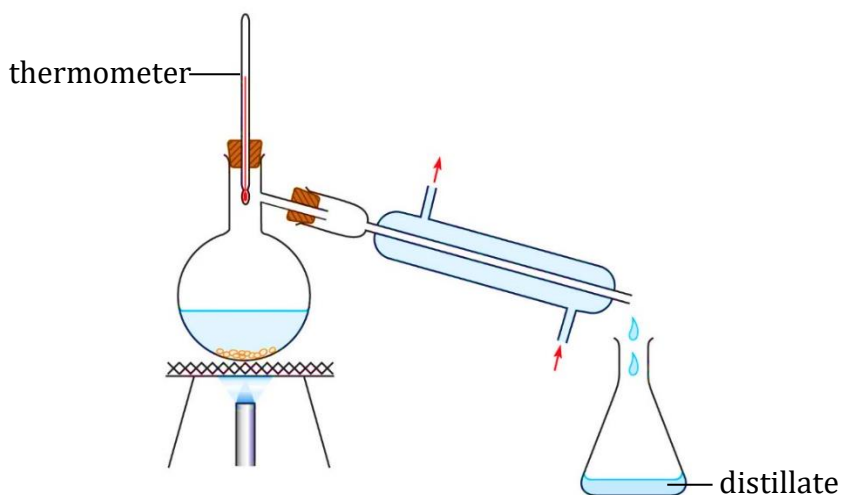
A copy of the Periodic Table is printed on page 9.

- 1 A student carried out an experiment involving the reaction between calcium carbonate and dilute hydrochloric acid.

Based on the experimental results obtained, a graph of volume of gas produced against time was plotted.

Which apparatus were used by the student to make the necessary measurements?

- A burette, pipette and stopwatch
 - B electronic balance and gas syringe
 - C gas syringe and stopwatch
 - D pipette and stopwatch
- 2 Aqueous iron(II) sulfate, a pale green solution, is distilled using the set-up shown.



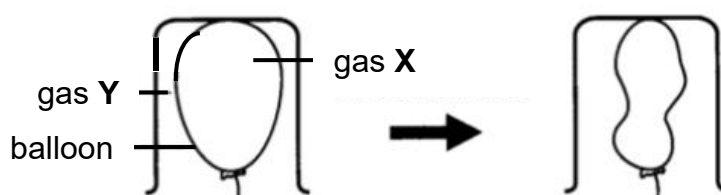
What is the temperature shown by the thermometer and the colour of the distillate in the conical flask?

	temperature / °C	colour of distillate
A	100	colourless
B	100	pale green
C	106	colourless
D	106	pale green

- 3 Dry ice sublimates at $-78\text{ }^{\circ}\text{C}$.

Which statement describes what happens to dry ice at $0\text{ }^{\circ}\text{C}$?

- A The carbon dioxide particles become closely packed.
 - B The carbon dioxide particles become far apart.
 - C The carbon dioxide particles become smaller.
 - D The carbon dioxide particles lose energy to the surroundings.
- 4 A balloon filled with gas **X** is placed inside a beaker filled with gas **Y**. After a few hours, the balloon shrinks in size.



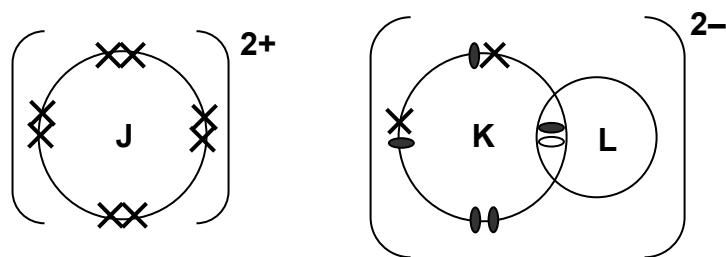
Which pair of gases would **not** cause the result shown above?

	gas X	gas Y
A	ammonia	nitrogen
B	carbon dioxide	argon
C	nitrogen	carbon dioxide
D	oxygen	fluorine

- 5 In which option does each of the three particles have the same total number of electrons?

- A Cl^- , Br^- , I^-
- B F^- , Ne , Na^+
- C K^+ , Br^- , Ca^{2+}
- D Li^+ , Na^+ , K^+

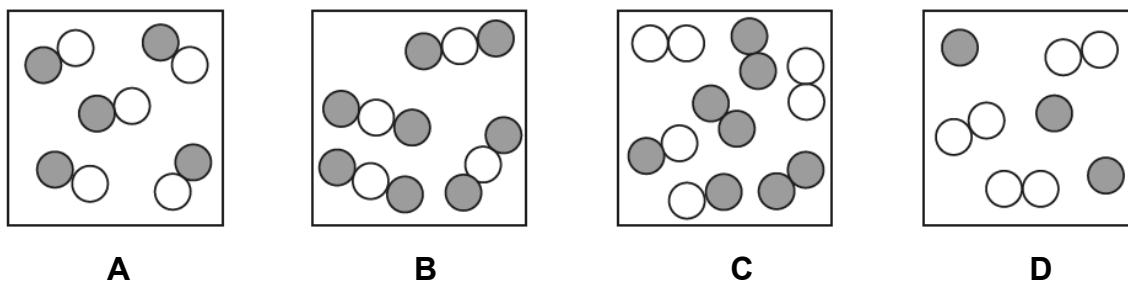
- 6 **J**, **K** and **L** are three different elements in the Periodic Table. The 'dot and cross' diagram (showing only the valence electrons) of the compound formed between **J**, **K** and **L** is shown below:



- I Element **K** could be nitrogen.
- II Element **J** belongs to Group 2 of the Periodic Table.
- III Element **K** and element **L** are bonded together by a covalent bond.
- IV Element **L** is a metal.

Which statements about the three elements are correct?

- A I, II and III
 - B I, II and IV
 - C I, III and IV
 - D II, III and IV
- 7 Which diagram below represents an incomplete reaction between two elements?

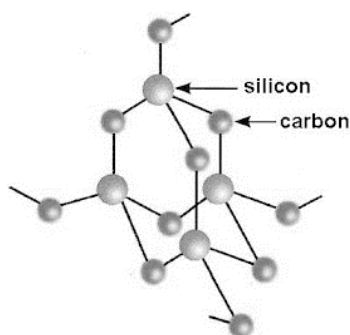


- 8 Element **V** has 14 neutrons and 13 protons while element **W** has 10 neutrons and 9 protons in their respective nucleus.

What would be the molar mass of the compound formed between **V** and **W**?

- A 84 g/mol
- B 100 g/mol
- C 168 g/mol
- D 200 g/mol

- 9 The diagram shows the structure of silicon carbide.



Silicon carbide is a hard solid. Which statement about silicon carbide explains this property?

- A A lot of energy is needed to slide the layers of atoms.
 - B Atoms are bonded by strong covalent bonds in a giant network.
 - C The giant covalent structure is held by strong ionic bonds.
 - D The molecules are held by strong attractive forces.
- 10 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 $(\text{NH}_2)_2\text{CO}$
 - B $(\text{NH}_4)_2\text{CO}_3$
 - C $\text{NH}_4\text{CO}_2\text{NH}_4$
 - D $\text{NH}_2\text{CO}_2\text{NH}_4$
- 11 Some statements about acids are given below.
- I pH is a measure of the H^+ concentration in a solution.
 - II The strength of an acid depends on its concentration.
 - III Universal Indicator turns orange when placed in a solution of any acid.
 - IV When acids react with metals, hydrogen ions gain electrons.

Which statements about acids are correct?

- A I and II only
- B I and IV only
- C I, II and III
- D I, II and IV

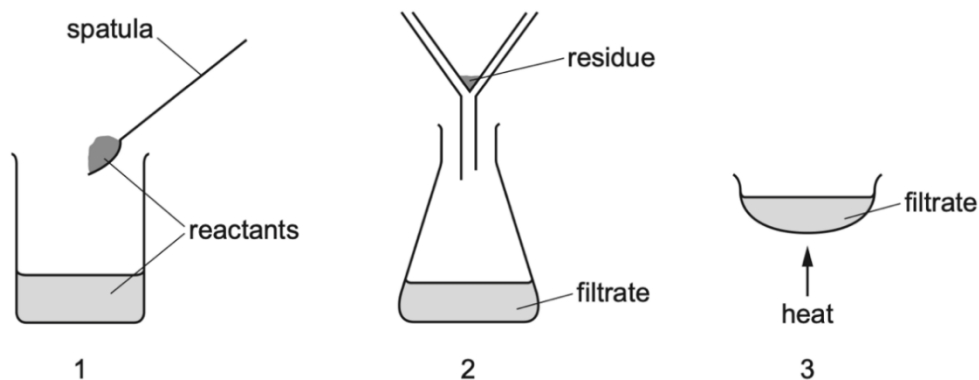
12 Which equation suggests that a metal oxide, RO, behaves as an amphoteric oxide?

- A** $\text{RO (s)} + 2\text{H}^+ \text{(aq)} \rightarrow \text{R}^{2+} \text{(aq)} + \text{H}_2\text{O (l)}$
B $\text{RO (s)} + 2\text{OH}^- \text{(aq)} \rightarrow \text{RO}_2^{2-} \text{(aq)} + \text{H}_2\text{O (l)}$
C $\text{RO (s)} + \text{H}_2\text{O (l)} \rightarrow \text{R}^{2+} \text{(aq)} + 2\text{OH}^- \text{(aq)}$
D $\text{RO (s)} + 2\text{NH}_4^+ \text{(aq)} \rightarrow \text{R}^{2+} \text{(aq)} + \text{H}_2\text{O (l)} + 2\text{NH}_3 \text{(g)}$

13 Which of the following does **not** show the appropriate reagents used for preparation of the named salts?

	salt	reagents
A	copper(II) sulfate	copper(II) carbonate + sulfuric acid
B	lead(II) nitrate	lead(II) oxide + nitric acid
C	magnesium chloride	magnesium nitrate + hydrochloric acid
D	zinc chloride	zinc hydroxide + hydrochloric acid

14 The diagrams show three stages, 1, 2 and 3, used in the preparation of salt.



Which row correctly shows the solubilities of both of the reactants and of the salt formed in this preparation?

	solubility of reactants	solubility of salt formed
A	both soluble	insoluble
B	both soluble	soluble
C	one soluble, one insoluble	insoluble
D	one soluble, one insoluble	soluble

- 15 How can a pure sample of lead(II) sulfate be obtained from lead(II) carbonate?
- A Add lead(II) carbonate directly to dilute sulfuric acid, filter the mixture and wash the residue.
 - B Add lead(II) carbonate directly to dilute sulfuric acid, filter the mixture and crystallise the filtrate.
 - C Add lead(II) carbonate to dilute nitric acid, then add dilute sulfuric acid, filter the mixture and wash the residue.
 - D Add lead(II) carbonate to dilute nitric acid, then add dilute sulfuric acid, filter the mixture and crystallise the filtrate.
- 16 An excess of barium chloride solution is added to a solution of magnesium sulfate and a white precipitate is formed. The mixture is then filtered to obtain the filtrate. Which solution would **not** produce a precipitate when added to the filtrate?
- A iron(II) sulfate
 - B potassium nitrate
 - C silver nitrate
 - D sodium carbonate
- 17 When dichlorine heptoxide, Cl_2O_7 is added to water, a reaction takes place which is **not** a redox process. What could the product(s) of the reaction be?
- A Cl_2 and O_2
 - B HCl and O_2
 - C HClO
 - D HClO_4
- 18 Which of the statement(s) is/are true about the elements in Group 1 of the Periodic Table?
- I They are reducing agents.
 - II The ionic radius increases down the group.
 - III The melting point decreases down the group.
- A I only
 - B I and II only
 - C II and III only
 - D I, II and III

19 **W**, **X** and **Y** are elements in the same period of the Periodic Table.

- **X** forms compounds of formulae **XO** and **X₂O₃**.
- **Y** forms a solution of pH 14 when it reacts with water
- The reaction of **W** with water is less vigorous than the reaction of **Y** with water.

In which order, from left to right in the period, are the elements in the Periodic Table?

A **W** → **Y** → **X**

B **X** → **W** → **Y**

C **X** → **Y** → **W**

D **Y** → **W** → **X**

20 Nickel is between iron and lead in the reactivity series.

Which of the following can be deduced from this statement?

- A** Nickel can be displaced from its aqueous salt solution by iron.
- B** Nickel can be obtained by moderate heating of nickel carbonate.
- C** Nickel can displace hydrogen rapidly from hot water.
- D** Nickel gains electrons more readily than lead.

The Periodic Table of Elements

Group																	
1	2											13	14	15	16	17	18
Key proton (atomic) number atomic symbol name relative atomic mass							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 oganeson –

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 dm³ at room temperature and pressure (r.t.p.).

The Avogadro constant, $L = 6.02 \times 10^{23} \text{ mol}^{-1}$