Class Register No.

Candidate Name _____

**PEIRCE SECONDARY SCHOOL**
**PRELIMINARY EXAMINATION 2022**
**SECONDARY 4 EXPRESS / 5 NORMAL ACADEMIC**

**SCIENCE (CHEMISTRY/BIOLOGY)** **5078/01**
Paper 1 Multiple Choice **31 AUGUST 2022**
**1 hour**

Additional Materials:
Multiple Choice Answer Sheet
Periodic Table

**INSTRUCTIONS TO CANDIDATES**

Write in soft pencil.
Do not use paper clips, highlighters, glue or correction fluid.
Write your name, register number and class on the Multiple Choice 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 Multiple Choice Answer Sheet.

A copy of the Data Sheet is printed on page 18 .

**Read the instructions on the Multiple Choice 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 paper.

**1** Which statement provides the best evidence for diffusion?

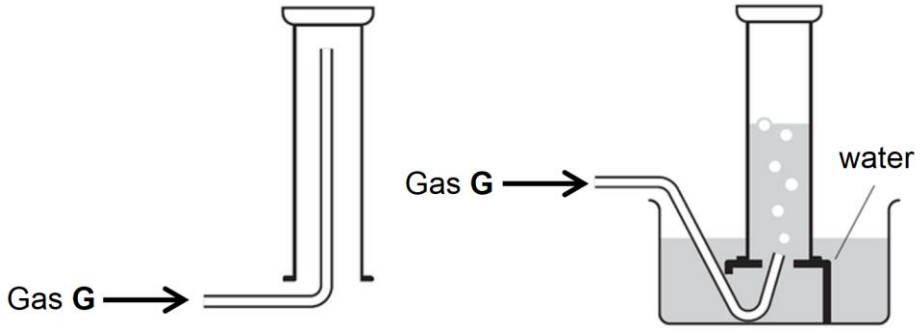
**A** Aroma of cooking travels from kitchen to all parts of the house.

**B** Solid dry ice changes to gas at room temperature.

**C** Water boils at a higher temperature when salt is added.

**D** Wet clothes dry quickly in the hot day.

**2** Two methods of collecting gas **G** are shown.




Which properties of gas **G** are shown by these collection methods?

| | density of gas **G** | solubility of gas **G** in water |
|---|---|---|
| **A** | denser than air | insoluble |
| **B** | denser than air | soluble |
| **C** | less dense than air | insoluble |
| **D** | less dense than air | soluble |

**3** Reagents are added to solutions of four different ions.
Which reaction does **not** produce a gas?

| | **ion** | **reagents added** |
|---|---|---|
| **A** | $CO_3^{2-}(aq)$ | dilute hydrochloric acid |
| **B** | $NH_4^{+}(aq)$ | aqueous sodium hydroxide |
| **C** | $NO_3^{-}(aq)$ | aluminium foil and aqueous sodium hydroxide,warm |
| **D** | $SO_4^{2-}(aq)$ | dilute nitric acid and aqueous barium nitrate,warm |

**4** Substance **Q** is a yellow substance that is insoluble in water.
It has a melting point of 115 $^{o}$C and boiling point of 446 $^{o}$C.
Which method would be suitable for separating **Q** from a mixture of **Q** and water?

**A** crystallisation

**B** distillation

**C** filtration

**D** fractional distillation

**5** Which statement is true?

**A** A fluoride ion has more electrons than a sodium ion.

**B** An iron (III) ion is formed by an iron atom gaining 3 electrons.

**C** A neon atom has more electrons than a fluoride ion.

**D** A magnesium atom has more electrons than a magnesium ion.

**6** An element **X** has 3 electrons in its outermost shell.
What should be the chemical formula of the sulfate of element **X**?

**A** $\mathbf{X}SO_4$

**B** $\mathbf{X}_2SO_4$

**C** $\mathbf{X}(SO_4)_2$

**D** $\mathbf{X}_2(SO_4)_3$

**7** Which of the following lists gives an element, a mixture and a compound?

**A** air, boron and carbon dioxide

**B** brass, carbon, fluorine

**C** cobalt, hydrogen, steel

**D** iodine, magnesium, sodium chloride

**8** What is equivalent to 1 mol of water?

**A** 0.5 g of water

**B** 2 mol of hydrogen molecules and 1 mol of oxygen molecules

**C** 24 $dm^3$ of water vapour at r.t.p.

**D** $6 \times 10^{23}$ hydrogen and oxygen atoms

**9** Which of the following oxides will react with both acids and alkalis to form salt and water?

**A** calcium oxide

**B** carbon dioxide

**C** lead (II) oxide

**D** nitrogen monoxide

**10** The pH of soil in a farm is around 6.0 to 6.5.
The farmer wants to grow black currant which grows well in soil with a pH 7.5.
Which of the following is most suitable to be added to the soil?

**A** calcium chloride

**B** calcium hydroxide

**C** calcium nitrate

**D** calcium sulfate

**11** Which metal reacts with steam, but not with cold water?

**A** copper

**B** iron

**C** magnesium

**D** potassium

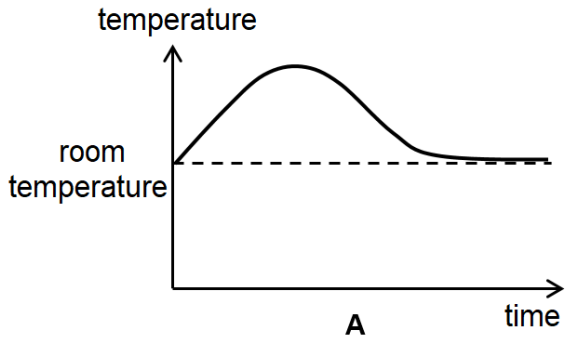
**12** Experiments are carried out to determine the order of reactivity of metals **X**, **Y** and **Z**. The table shows the results.

| Experiment | **X** | **Y** | **Z** |
|---|---|---|---|
| Does the metal liberate hydrogen from dilute hydrochloric acid? | Yes | No | Yes |
| Is the metal oxide reduced by heating with carbon? | Yes | Yes | No |

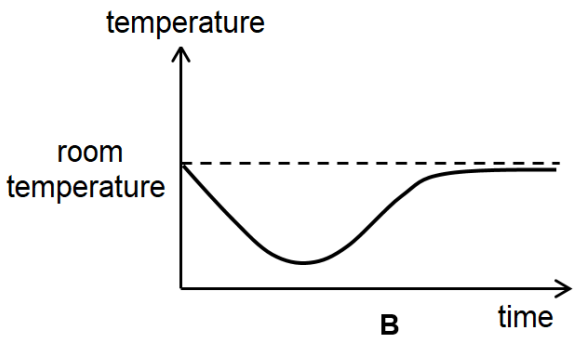
What is the order of reactivity of the metals?

| | Most reactive | → | Least reactive |
|---|---|---|---|
| **A** | **X** | **Z** | **Y** |
| **B** | **Y** | **X** | **Z** |
| **C** | **Z** | **X** | **Y** |
| **D** | **Z** | **Y** | **X** |

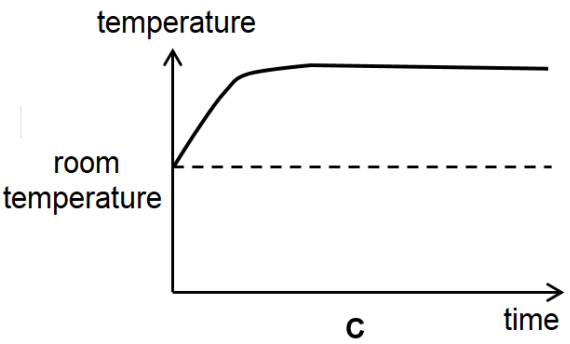
**13** When dilute hydrochloric acid reacts with aqueous sodium hydroxide, heat is given out.
Which of the following graphs shows how the temperature of the mixture changes as the reaction progresses and the remaining mixture is left to stand for some time?



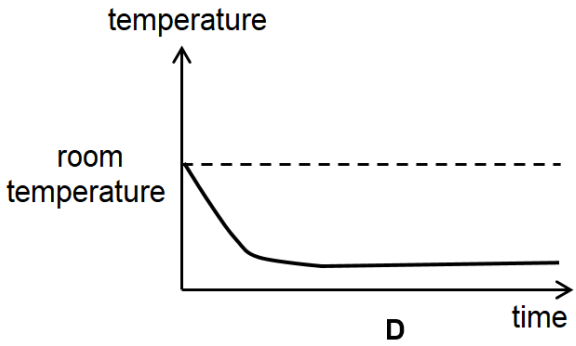

**A**




**B**




**C**




**D**

**14** In which list are the major components of the atmosphere placed in order of **decreasing** abundance?

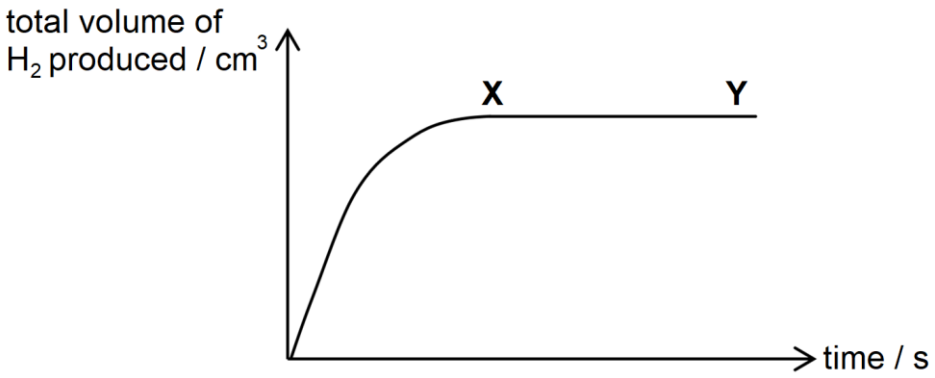
**A** nitrogen → noble gases → oxygen

**B** nitrogen → oxygen → noble gases

**C** oxygen → nitrogen → noble gases

**D** oxygen → noble gases → nitrogen

**15** The graph shows how the total volume of hydrogen produced by the reaction between dilute hydrochloric acid and excess zinc varied with time.




Which statement about section **XY** of the curve is **not** correct?

**A** All the zinc has reacted.

**B** All the dilute hydrochloric acid has reacted.

**C** The rate of the reaction is zero.

**D** The volume of hydrogen produced is at a maximum.

**16** Which of the equations below shows a redox reaction?

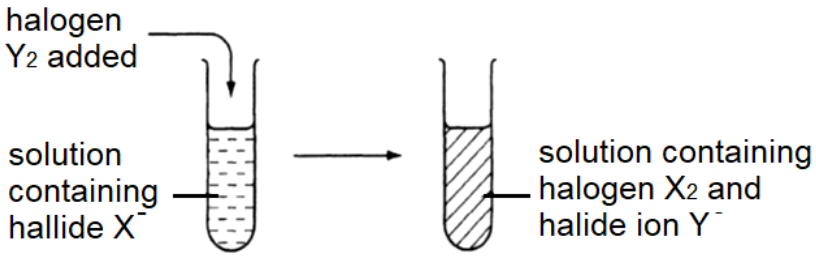
**A** $HCl + NaOH \rightarrow NaCl + H_2O$

**B** $HCl + AgNO_3 \rightarrow AgCl + HNO_3$

**C** $2\,HCl + 2\,Na \rightarrow 2\,NaCl + H_2$

**D** $2\,HCl + Na_2CO_3 \rightarrow 2\,NaCl + H_2O + CO_2$

**17** The diagram shows an experiment involving halogens and aqueous halide ions.




Which choices of $Y_2$ and $X^-$ give the result shown?

| | $Cl_2 + Br^-$ | $I_2 + Br^-$ | $Cl_2 + I^-$ |
|---|---|---|---|
| **A** | ✓ | ✓ | ✓ |
| **B** | ✓ | ✓ | × |
| **C** | × | ✓ | ✓ |
| **D** | ✓ | × | ✓ |

Key
✓ = observations
× = no observation

**18** Which of the following gases is a main component in natural gas?

**A** carbon dioxide
**B** ethane
**C** hydrogen
**D** methane

**19** Which reaction is an example of a substitution reaction?

**A** $C_2H_4 + Cl_2 \rightarrow C_2H_4Cl_2$
**B** $C_2H_6 + Cl_2 \rightarrow C_2H_5Cl + HCl$
**C** $C_2H_4 + 3O_2 \rightarrow 2CO_2 + 2H_2O$
**D** $C_{10}H_{22} \rightarrow C_3H_6 + C_7H_{16}$

**20** Which compound can be oxidised to ethanoic acid, $CH_3COOH$?

**A** $CH_3OH$
**B** $CH_3CH_2OH$
**C** $CH_3CH_2CH_2OH$
**D** $CH_3CH_2CH_2CH_2OH$

## 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 |
| lead(II) hydroxide | white |
| zinc hydroxide | white |