OVERMUGGED O LEVEL MOCK PAPER 2021
SECONDARY 4 EXPRESS
SECONDARY 5 NORMAL ACADEMIC

COMBINED SCIENCE (CHEMISTRY) **5076/01|5078/01**
PAPER 1: MULTIPLE CHOICES **September 2021**
1 hour

INSTRUCTIONS TO CANDIDATES

There are **forty** questions in this paper. Answer **all** questions. For each question, there are 4 possible answers, **A, B, C and D**.

Choose the one you consider correct.

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

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

**Questions in this mock paper may contain adapted questions from the Ten Year Series and Prelim Papers from various schools in Singapore.*

1. Below shows the properties of Gas X & Gas Y.

- Gas X is insoluble in water while Gas Y is soluble in water.
- Both gases have Mr greater than 40.

Which row shows the **correct collection method** for the gases?

	Gas X	**Gas Y**
(A)	Displacement of water	Downward delivery
(B)	Displacement of water	Upward delivery
(C)	Upward delivery	Displacement of water
(D)	Downward delivery	Displacement of water

2. Which gas is neither an element nor a compound?

(A) Water vapour
(B) Air
(C) Ammonia
(D) Nitrogen gas

3. The table below shows the melting and boiling points of some pure substances.

Substance	**Melting point /** °C	**Boiling point /** °C
W	-45	23.5
X	-138	-36
Y	220	587
Z	-141	-121

The following analyses were made:

(i) Substance W is likely a volatile compound.
(ii) Substance X exists as a gas at room temperature and pressure.
(iii) Substance Y exists as a solid at room temperature and pressure.
(iv) Substance Z is likely to exist as a diatomic molecule at room temperature and pressure.

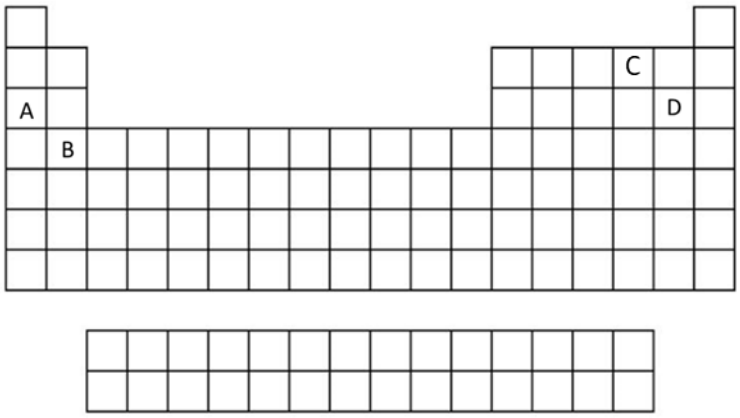
Which of the following statements are **true**?

(A) ii only
(B) i & ii only
(C) i, ii & iii only
(D) All of the above

4. Which of the following statement is **true** for Boron (B^{3+}) ion?

(A) The ion contains 10 sub-atomic particles in the nucleus.
(B) A boron atom has to gain 3 protons to gain a charge of 3+.
(C) An isotope of boron will have a different number of protons.
(D) There are more neutrons that electrons in the B^{3+} ion. __

5. Refer to the periodic table below.



Which of the following statement is **true**?

(A) Ion B will have the same number of electrons as element D.
(B) An ionic compound with chemical formula A_2C can be formed.
(C) An isotope of element D can have the same proton number as element B. __
(D) The electrostatic forces of attraction between A and D will be strong than C and B.

6. A mixture of ammonia and oxygen was passed over heated platinum. Nitrogen and water were formed.

$$\mathbf{w}NH_3 + \mathbf{x}O_2 \rightarrow \mathbf{y}N_2 + \mathbf{z}H_2O$$

What are the **values of w, x, y & z**?

	w	**x**	**y**	**z**
(A)	2	2	1	4
(B)	2	3	1	3
(C)	4	3	2	6
(D)	4	2	2	6

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7. How much sulfuric acid is needed to neutralise exactly 25.0cm^3 of 1.0 mol/dm^3 of potassium hydroxide?

(A) 10.0cm^3 of 2.0 mol/dm^3 sulfuric acid
(B) 12.5cm^3 of 1.5 mol/dm^3 sulfuric acid
(C) 5.0cm^3 of 2.5 mol/dm^3 sulfuric acid
(D) 50.0cm^3 of 1.0 mol/dm^3 sulfuric acid

8. Rubidium, Rb, is a **Group I element**.

Which method is **most likely** to be used in its **extraction**?

(A) Electrolysis of aqueous rubidium chloride
(B) Electrolysis of molten chloride
(C) Heating of rubidium ore with carbon
(D) Heating of rubidium ore with hydrogen

9. In which reaction is dilute hydrochloric acid **not behaving like an acid**?

(A) HCl (aq) + NaOH (aq) → NaCl (aq) + H_2O (l)
(B) HCl (aq) + $AgNO_3$ (aq) → AgCl (s) + HNO_3 (aq)
(C) 2HCl (aq) + CuO (s) → $CuCl_2$ (aq) + H_2O (l)
(D) 2HCl (aq) + Zn (s) → $ZnCl_2$ (aq) + H_2 (g)

10. Refer to the table below.

The colours of indicators in acidic and basic solutions

Indicator	Colour on acid side	pH at colour change	Colour on basic side
methyl orange	red	3–5	yellow
litmus	red	5–8	blue
phenolphthalein	colourless	8–10	pink

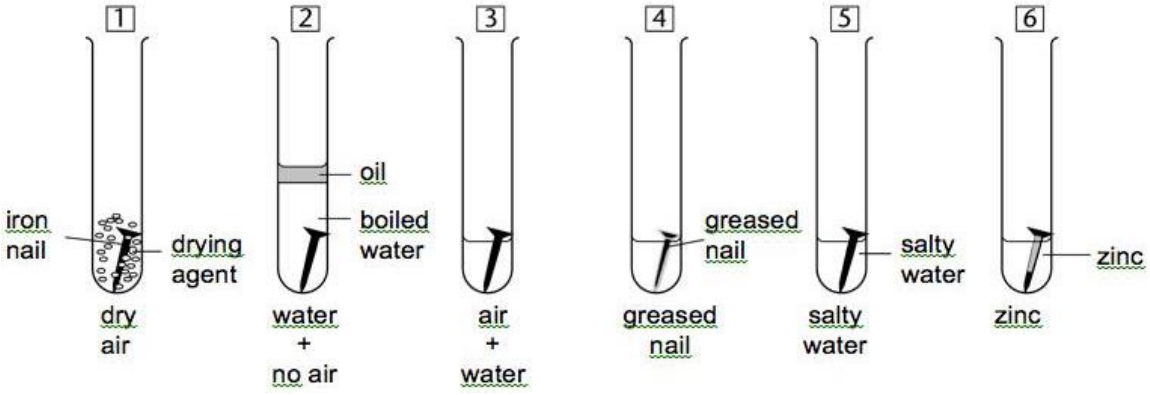
Suggest the **appropriate indicator** for a neutralisation reaction when **weak acid** is added via a burette into a conical flask containing a **strong alkaline**.

(A) methyl orange
(B) litmus
(C) phenolphthalein
(D) None of the above

11. Which **pair of reactants** can **safely prepare sodium nitrate**?

(A) sodium and nitric acid
(B) sodium and potassium nitrate
(C) sodium hydroxide and zinc nitrate
(D) sodium hydroxide and nitric acid

12. Refer to the following set-ups that are left in this state for three days.



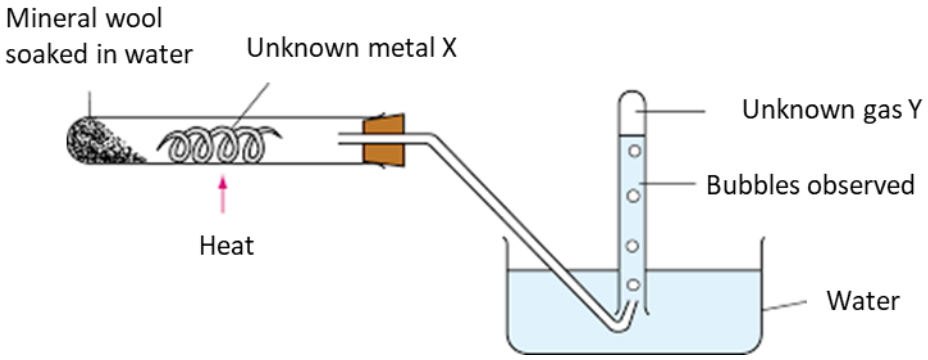
Choose the **correct set of results**.

	Will not rust	**Will rust**	**Rust the fastest**
(A)	1,2,4	5,6	3
(B)	1,2,4,6	5	3
(C)	1,2,4	3,6	5
(D)	1,2,4,6	3	5

13. Which of the statement about the **trend** when moving **down Group VII** is **false**?

(A) Down Group VII, colour intensity increases.
(B) Down Group VII, melting and boiling point increases.
(C) Down Group VII, density increases.
(D) Down Group VII, reactivity increases.

14. Refer to the set-up below.



Which is the **identity of metal X and gas Y**?

	Metal X	**Gas Y**
(A)	Copper	Oxygen gas
(B)	Copper	Hydrogen gas
(C)	Zinc	Oxygen gas
(D)	Zinc	Hydrogen gas

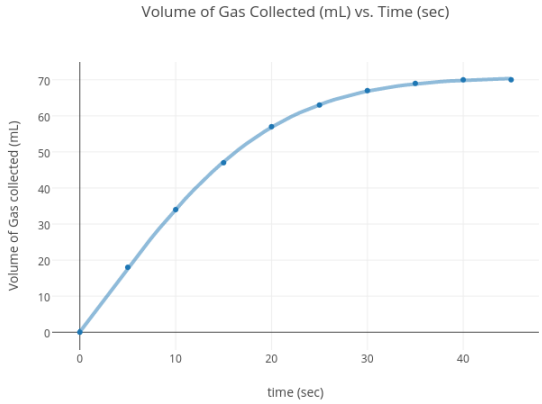
15. Which of the following pollutant is **incorrectly matched** with its source and effect?

	Pollutant	**Source**	**Effect**
(A)	Methane	Decay of living organisms	Global warming
(B)	Nitrogen dioxide	Lightning strikes	Acid rain
(C)	Ozone	Photochemical smog	Damages crops
(D)	Carbon monoxide	Incomplete combustion in car engines	Greenhouse gas

16. Identify the **bolded element** with the correct oxidation state within the compound.

	Compound	Oxidation state
(A)	$Cu\underline{\mathbf{S}}O_4$	+8
(B)	$K_2\underline{\mathbf{Cr}}_2O_7$	+6
(C)	$\underline{\mathbf{C}}O_2$	0
(D)	$Ca\underline{\mathbf{C}}O_3$	-4

17. The graph below shows the reaction between sodium hydroxide and excess ammonium chloride.



Which of the following statement is **true**?

(i) Rate of reaction is highest at the 5s mark.
(ii) Sodium hydroxide is fully used up after 40s.
(iii) The rate of reaction decreases after 15s and eventually comes to a stop.
(iv) Ammonium hydroxide is fully used up after 40s.

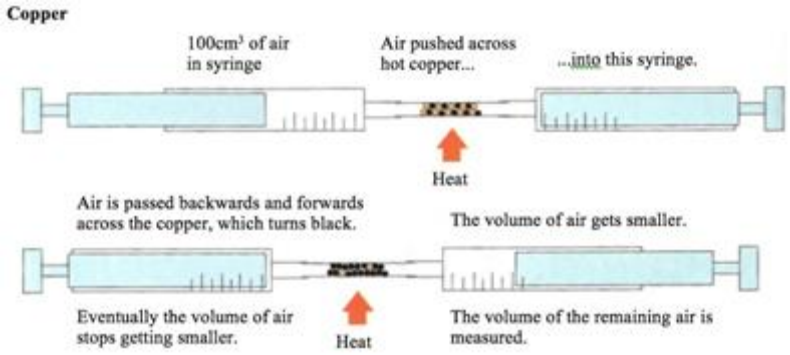
(A) ii only
(B) i & ii only
(C) i, ii & iii only
(D) All of the above

18. Which statement is **true** for **all metals**?

(i) All metals have high melting & boiling points.
(ii) All metals exist as solid state at room temperature and pressure.
(iii) All metals are good conductors of heat and electricity.
(iv) All metals can react with acid to produce hydrogen gas.

(A) iii only
(B) i & iii only
(C) i, ii & iii only
(D) All of the above

19. An experiment was done where by **100cm^3 of a sample of air** was heated over a mass of copper until no further reaction.



When the tube is cooled to room temperature, the **remaining volume of air is 75cm^3**. What is the **percentage of oxygen** in the syringe?
(A) 15%
(B) 20%
(C) 25%
(D) 30%

20. Aqueous ammonia was added to a solution. A white precipitate was formed which dissolves in excess aqueous ammonia.

When acidified barium nitrate was added to the solution, a white precipitate is formed.

Identify the **salt** present in the solution.

(A) Lead chloride
(B) Lead sulfate
(C) Zinc chloride
(D) Zinc sulfate