07 Practical Chemistry and Qualitative Analysis

Set B Competition Practice

Name | Time 20 minutes | Total 13 marks | Score ____ / 13

Marks by notes section For the marker: total each row. A score below the target means that section of the notes needs revising.

Notes section	Questions	Marks	Target	Score
1 Measuring Physical Quantities	1, 2	2	2	
2 Collecting and Drying Gases	3, 4, 5	3	2	
3 Titration Technique	6	1	1	
4 Testing for Cations	7, 8, 9, 10	4	3	
5 Testing for Anions	11, 12	2	2	
7 Accuracy, Precision and Error	13	1	1	

A Competition questions

13 MARKS

1 An experiment was conducted to measure the temperature change caused by adding a known quantity of sodium carbonate to an excess of dilute acid. Besides a thermometer and styrofoam cup, these apparatus are available.

1 gas syringe
2 mass balance
3 measuring cylinder
4 stopwatch

Which pieces of apparatus are needed for this experiment?

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

Answer ____ [1]

/1

Source: 2024 AES O Prelim P1 Q1

2 A student investigates the rate of reaction between an excess of acid of different concentrations and a known quantity of calcium carbonate granules. During the reaction, the student measures the volume of gas released.

In addition to a conical flask and a balance, the following pieces of apparatus are available.

1 gas syringe
2 thermometer
3 measuring cylinder
4 stopwatch

Which pieces of apparatus are needed for this experiment?

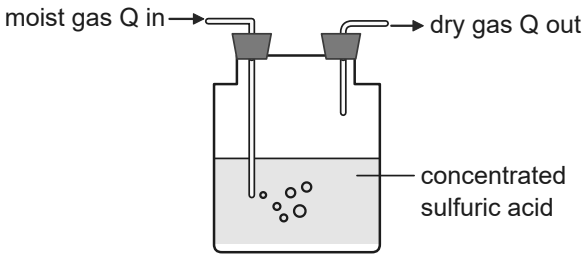
A 1, 3 and 4 only
B 1 and 3 only
C 1 and 4 only
D 2, 3 and 4 only

Answer ☐ [1]

/1

Source: 2024 Dunman O Prelim P1 Q1

3 The setup used to dry gas Q is shown.



What can be deduced about gas Q?

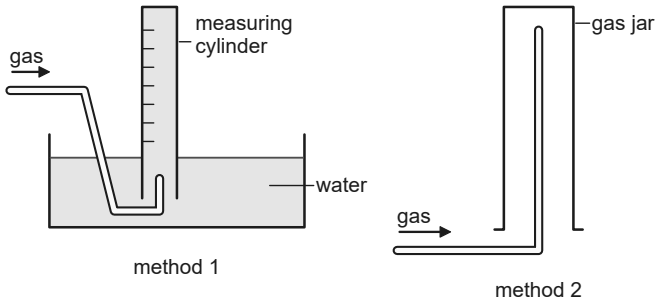
A Gas Q is denser than air.
B Gas Q is either acidic or neutral.
C Gas Q is insoluble in water.
D Gas Q is soluble in concentrated sulfuric acid.

Answer ☐ [1]

/1

Source: 2024 Jurongville O Prelim P1 Q1

4 The diagrams show two methods of gas collection.



Which pair of gases can be collected by both methods?

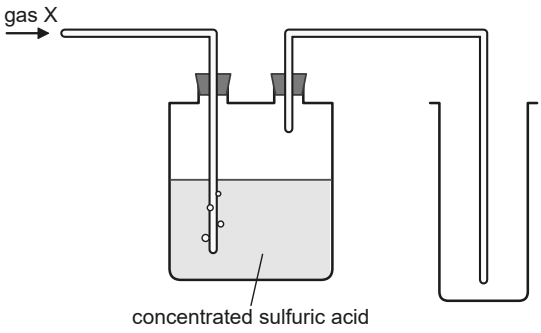
A ammonia and hydrogen
B carbon dioxide and sulfur dioxide
C hydrogen and methane
D nitrogen and hydrogen chloride

Answer ☐ [1]

/1

Source: 2026 Dunman O Prelim P1 Q2

5 The diagram shows an experimental setup to produce and collect a dry sample of gas X.



What is gas X?

A ammonia gas
B hydrogen chloride gas
C hydrogen gas
D steam

/1

Answer [1]

Source: 2024 Dunman O Prelim P1 Q2

6 A student titrated 25.0 cm^3 of hydrochloric acid with 0.1 mol/dm^3 aqueous sodium hydroxide, using methyl orange. Which step would make her calculated concentration of hydrochloric acid higher than its true value?

A The burette was rinsed with distilled water followed by aqueous sodium hydroxide.
B The conical flask was rinsed with distilled water followed by hydrochloric acid.
C The titration reading was taken when methyl orange turned orange.
D The burette was read at an angle.

/1

Answer [1]

2024 Serangoon O Prelim P1 Q16

7 Tests are done to identify an unknown salt P.

step	test	observations
1	Dissolve 5 g of P in 10 cm^3 of water.	Green solution formed.
2	To a sample, add aqueous ammonia dropwise and allow it to stand for 5 minutes.	Green precipitate formed, which turns reddish-brown.
3	To another sample, add nitric acid followed by aqueous barium nitrate.	White precipitate formed.

What is the formula of salt P?

A $CuSO_4$ **B** $FeCl_3$ **C** $FeSO_4$ **D** $Fe_2(SO_4)_3$

/1

Answer [1]

2024 Zhonghua O Prelim P1 Q20

8 10.0 cm^3 of 1.0 mol/dm^3 aqueous iron(II) sulfate was mixed with 10.0 cm^3 of 1.0 mol/dm^3 aqueous sodium hydroxide: $FeSO_4(aq) + 2NaOH(aq) \rightarrow Fe(OH)_2(s) + Na_2SO_4(aq)$. What did the flask contain when the reaction was complete?

A A green precipitate only.

B A green precipitate in a colourless solution.

C A white precipitate in a green solution.

D A green precipitate in a green solution.

/1

Answer [1]

2024 CHIJ O Prelim P1 Q21

9 An aqueous solution contains 0.01 mol of zinc ions and 0.01 mol of copper(II) ions. Aqueous ammonia is added until in excess. After shaking, the mixture is filtered. What remains on the filter paper?

A 0.01 mol of a blue hydroxide

B 0.01 mol of a white hydroxide

C 0.01 mol of a white hydroxide and 0.01 mol of a blue hydroxide

D no solid residue

/1

Answer [1]

2024 Bukit View O Prelim P1 Q23

10 P is a white powdery solid. P dissolved in distilled water to form a blue solution. The solution was divided into two test tubes. In the first, a blue precipitate formed on dropwise addition of aqueous ammonia, which dissolved in excess to form a deep blue solution. In the second, a white precipitate formed on adding an equal volume of acidified aqueous barium nitrate. The mixture was filtered and the filtrate crystallised to give solid Q. What are P and Q?

	P	Q
A	barium sulfate	barium sulfate
B	barium sulfate	copper(II) nitrate
C	copper(II) sulfate	barium sulfate
D	copper(II) sulfate	copper(II) nitrate

A row A **B** row B **C** row C **D** row D

/1

Answer [1]

2023 Catholic High School O Prelim P1 Q7

11 A student reacted excess calcium with hydrochloric acid and carried out tests on the reaction mixture. Which observation does **not** show that the reaction has occurred?

	test	observation
A	Add dilute nitric acid followed by aqueous silver nitrate.	white precipitate
B	Weigh the reaction mixture at the start and at the end.	mass decreases
C	Test the pH of the mixture at the start and after 30 s.	pH increases
D	Add aqueous sodium hydroxide until no further change.	white precipitate insoluble in excess

A row A **B** row B **C** row C **D** row D

/1

Answer [1]

2024 SCGS O Prelim P1 Q6

12 Which method would **not** produce ammonia?

A compressing hydrogen and nitrogen at a high temperature with an iron catalyst

B heating ammonium sulfate with hydrochloric acid

C heating an alkaline solution containing calcium nitrate and aluminium powder

D warming concentrated aqueous ammonia

/1

Answer [1]

2026 Dunman O Prelim P1 Q16

13 Measured values of the pressure, volume and temperature of a known mass of a gas are substituted into the ideal gas equation to calculate its relative molecular mass. Which conditions would give the most accurate value of M_r?

	pressure	temperature
A	high	high
B	high	low
C	low	high
D	low	low

A row A **B** row B **C** row C **D** row D

/1

Answer [1]

2021 YIJC J1 MYE P1 Q14