

APOLLO

Stoichiometry FBISE Chemistry Class 11 (HSSC-I)

Domain B: Physical Chemistry

43 questions | questions

Original FBISE question crops. National Curriculum 2022-23 topic.

9.	Number of moles present in 50 cm ³ of a 0.0800 mol dm ⁻³ solution of sodium carbonate is:	4 moles	0.4 moles	0.004 moles	0.04 moles
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10.	What volume will be occupied by 2 moles of oxygen gas at STP?	11.2 dm ³	22.4 dm ³	44.8 dm ³	2.24 dm ³
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15.	There are 6.02×10^{23} atoms in 0.25 mol of:	He	H ₂ O	BH ₃	CH ₄
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Scenario for MCQ 65 to 68		In a laboratory experiment, 1.0 g of ammonium nitrate (NH₄NO₃) is added to 0.8 g of sodium hydroxide (NaOH). The reaction proceeds according to the equation: $\text{NH}_4\text{NO}_3 + \text{NaOH} \rightarrow \text{NaNO}_3 + \text{NH}_3 + \text{H}_2\text{O}$ values: NH₄NO₃ = 80.0, NaOH = 40.0, NaNO₃ = 85.0, NH₃ = 17.0, H₂O = 18.0			
65.	Which reagent is the limiting reagent in this reaction, and why?	NaOH, because it has a low mass	NaOH, because it has fewer moles compared to NH ₄ NO ₃	NH ₄ NO ₃ , because it has fewer moles compared to NaOH	NH ₄ NO ₃ , because it produces less moles of product

Scenario for MCQ 65 to 68		In a laboratory experiment, 1.0 g of ammonium nitrate (NH₄NO₃) is added to 0.8 g of sodium hydroxide (NaOH). The reaction proceeds according to the equation: $\text{NH}_4\text{NO}_3 + \text{NaOH} \rightarrow \text{NaNO}_3 + \text{NH}_3 + \text{H}_2\text{O}$ values: NH₄NO₃ = 80.0, NaOH = 40.0, NaNO₃ = 85.0, NH₃ = 17.0, H₂O = 18.0			
66.	What is the maximum mass of NaNO ₃ that could be produced in this reaction?	0.425 g	1.06 g	0.850 g	2.12 g

Scenario for MCQ 65 to 68		In a laboratory experiment, 1.0 g of ammonium nitrate (NH₄NO₃) is added to 0.8 g of sodium hydroxide (NaOH). The reaction proceeds according to the equation: $\text{NH}_4\text{NO}_3 + \text{NaOH} \rightarrow \text{NaNO}_3 + \text{NH}_3 + \text{H}_2\text{O}$ values: NH₄NO₃ = 80.0, NaOH = 40.0, NaNO₃ = 85.0, NH₃ = 17.0, H₂O = 18.0			
67.	What volume of NH ₃ gas is formed at STP?	0.28 dm ³	1.12 dm ³	2.24 dm ³	22.4 dm ³

Scenario for MCQ 65 to 68		In a laboratory experiment, 1.0 g of ammonium nitrate (NH₄NO₃) is added to 0.8 g of sodium hydroxide (NaOH). The reaction proceeds according to the equation: $\text{NH}_4\text{NO}_3 + \text{NaOH} \rightarrow \text{NaNO}_3 + \text{NH}_3 + \text{H}_2\text{O}$ values: NH₄NO₃ = 80.0, NaOH = 40.0, NaNO₃ = 85.0, NH₃ = 17.0, H₂O = 18.0			
68.	If the actual mass of NaNO ₃ obtained is 0.80 g, what is the percentage yield of the reaction?	75.5 %	85.0%	50.0%	100%

Q1	In a laboratory experiment, 12.0 g of magnesium reacts with 14.0 g of hydrochloric acid according to the equation: $\text{Mg} + 2\text{HCl} \rightarrow \text{MgCl}_2 + \text{H}_2$ Identify the reactant which is in excess and explain your answer. Calculate the maximum volume of hydrogen gas produced at room temperature and pressure (RTP).	2+2	OR	A chemist tests three different fertilizer salt solutions and records their pH values: Ammonium chloride (NH₄Cl): pH = 5 (Acidic) Sodium carbonate (Na₂CO₃): pH = 11 (Basic) Sodium chloride (NaCl): pH = 7 (Neutral) Using the concept of salt hydrolysis, answer the following: why each salt solution shows acidic, basic, or neutral behaviour. Identify the ions responsible for hydrolysis in each case. Name the parent acid and parent base for each salt.
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4.	The number of molecules present in 67.2 dm ³ of He gas at STP is:	6.02 × 10 ²⁴	1.204 × 10 ²⁴	1.806 × 10 ²⁴	2.4 × 10 ²⁴	☐	☐	☐	☐
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	a) Cl₂ > F₂ b) H₂ > HBr c) N₂ > O₂	
(iv)	Write down three differences between limiting and non-limiting reactants.	03

What is molar volume? Calculate the volume occupied by 2000g of Cl ₂ gas at STP.	1+2	OR	Describe by giving an example. How are the elements arranged in different blocks of periodic table?	03
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Q.6	300 g Zn is reacted with 300 g HCl. $Zn + 2HCl \longrightarrow ZnCl_2 + H_2$ Calculate the mass of H_2 produced. In an experiment, if 6g H_2 is obtained, calculate percentage yield. (Atomic masses Zn=65.38 g/mol $H=1$ g/mol $Cl=35.5$ g/mol)	07	OR	State Hess's law with an example. Apply Hess's law to calculate enthalpy of formation of CH_3COOH . The standard enthalpies of combustion of carbon, hydrogen and acetic acid are -393.5 kJ/mol, -285.8 kJ/mol and -875 kJ/mol respectively.	2+5
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4th 12005 (B)

Second Annual 2025 | Section A Q2 | 1 mark

2.	The reactant that determines the maximum yield of a chemical reaction is called the:	Excess reactant	By-product	Catalyst	Limiting reactant
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Second Annual 2025 | Section A Q3 | 1 mark

3.	If 2 moles of H_2 react with 32g of O_2 , the number of moles of H_2O formed will be: $2H_2 + O_2 \rightarrow 2H_2O$	1	3	2
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Second Annual 2025 | Section B Q2(ii) OR | 3 marks

What mass of Mg is needed to produce $100cm^3$ of H_2 at STP? $Mg + 2HCl \rightarrow MgCl_2 + H_2$	03
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Second Annual 2025 | Section B Q2(vi) | 3 marks

(vi)	Determine the limiting reactant when 10g of Al reacts with 20g of Fluorine according to given equation: $2Al + 3F_2 \rightarrow 2AlF_3$	03	OR	Justify the followings: a. Atomic size decreases along the period. b. Metallic character increases along the Group.	1.5 + 1.5
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Second Annual 2025 | Section C Q4 | 7 marks

Q.4	Calculate the mass of Calcium Nitride prepared from 54.9 g of Ca and 43.2 g of N_2 . $3Ca + N_2 \rightarrow Ca_3N_2$ If actual yield is 0.13 moles of Ca_3N_2 then calculate the percentage Yield.	4+3	OR	Complete the following chemical equations by identifying the major products obtained for the preparation of alkyl halides: a. $CH_3CH_2OH \xrightarrow[ZnCl_2]{HCl}$ b. $CH_3CH_2OH \xrightarrow{SOCl_2}$	3+2 +2
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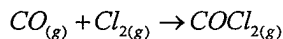
First Annual 2026 | Section B Q2(iv) OR | 3 marks

Calculate the mass of SO_2 that will be produced with 155g of Cu from the roasting of CuS. $CuS + O_2 \rightarrow Cu + SO_2$ ($Cu = 63.5gmol^{-1}$, $S = 32gmol^{-1}$)	03
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First Annual 2026 | Section B Q2(xii) OR | 3 marks

Calculate the volume of 177.5 g of chlorine gas at STP.	03
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Q.3 Phosgene is a toxic gas. This gas is prepared by the reaction of carbon monoxide with chlorine.



The following data were obtained for kinetic study of this reaction.

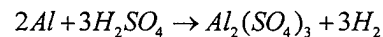
Experiment	Initial [CO]	Initial [Cl ₂]	Initial rate (moles dm ⁻³ s ⁻¹)
1	1.000	0.100	1.29×10 ⁻²⁹
2	0.100	0.100	1.30×10 ⁻³⁰
3	0.100	1.000	1.30×10 ⁻³⁰

a. Calculate the numerical value of the rate constant (k) for this reaction using initial rates.

06

OR

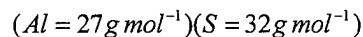
Hydrogen gas is produced by the following reaction:



When 40.5 g of Aluminium reacts with 196 g of H₂SO₄ then:

- Calculate the amount of H₂ in gram produced during this reaction.
- Calculate the amount of excess reactant left unreacted after the completion of chemical reaction.

06



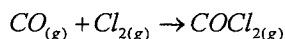
0.2 moles of NaCl, when completely ionized produce Na ⁺ ions:	1.204×10 ²²	1.204×10 ²³	2.4×10 ²²	2.4×10 ²³
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At STP, 71 g of Cl ₂ gas occupies:	11.2 dm ³	22.4 dm ³	44.8 dm ³	2 dm ³
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Calculate the mass of SO ₂ that will be produced with 155g of Cu from the roasting of CuS. $CuS + O_2 \rightarrow Cu + SO_2$ (Cu = 63.5gmol ⁻¹ , S = 32gmol ⁻¹)	03
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03	OR	How many grams of O ₂ molecules are there in 20dm ³ of oxygen gas at STP?	03
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Phosgene is a toxic gas. This gas is prepared by the reaction of carbon monoxide with chlorine.



The following data were obtained for kinetic study of this reaction.

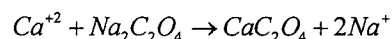
Experiment	Initial [CO]	Initial [Cl ₂]	Initial rate moles (moles dm ⁻³ s ⁻¹)
1	1.000	0.100	1.29×10 ⁻²⁹
2	0.100	0.100	1.30×10 ⁻³⁰
3	0.100	1.000	1.30×10 ⁻³⁰

Calculate the numerical value of the rate constant (k) for this reaction using initial rates.

06

OR

Calcium ions can be precipitated from solution by sodium oxalate.



When 15g Ca⁺² can be precipitated by 15g of Na₂C₂O₄ then:

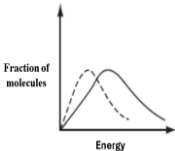
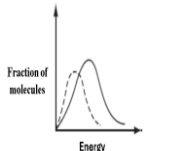
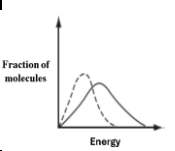
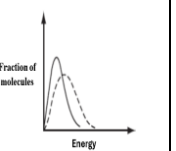
- Calculate the amount of CaC₂O₄ precipitates formed in gram.
- Calculate the amount of excess reactant left unreacted after the completion of chemical reaction.

06

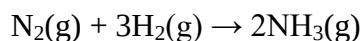
Q1. Fill the relevant bubble against each question according to curriculum. Each part carries one mark.

	Question	A	B	C	D	A	B	
i.	0.1 mole of NaCl contains 6.02×10^{22}	molecules	formula units	ions	atoms	☐	☐	☐

Q1. Fill the relevant bubble against each question according to curriculum. Each part carries one mark.

	Question	A	B	C	D	A	B	
i.	0.1 mole of NaCl contains 6.02×10^{22}	molecules	formula units	ions	atoms	☐	☐	☐
ii.	Which solid-line curve most accurately represents the distribution of molecular energy in a gas at 500 K if the dotted-line curve represents the corresponding distribution for the same gas at 300 K?					☐	☐	☐
iii.	For the rate law , $\text{Rate} = k[A]^{\frac{1}{2}}[B]$, predict order with respect to A, the order with respect to B and the total order.	$\frac{1}{2}$; 0; $\frac{1}{2}$	$\frac{1}{2}$; 1; 1	$\frac{1}{2}$; 1; $\frac{3}{2}$	$\frac{1}{2}$; 1; 2	☐	☐	☐
iv.	1 st Electron affinity of oxygen atom is greater than nitrogen because of,	greater nuclear charge of Nitrogen	more Screening effect of oxygen	less nuclear force of attraction of Nitrogen	greater nuclear force of attraction of oxygen	☐	☐	☐
v.	If the total energy of the product is greater than the reactants, identify the reaction.	Exothermic	Endothermic	Reduction	oxidation	☐	☐	☐
vi.	Suggest volume occupied by one mole of gas at STP.	224.14 dm^3	2.414 dm^3	0.022414 cm^3	22414 cm^3	☐	☐	☐

Starting from 20g of N_2 , calculate the mass of gaseous product (NH_3) in the given reaction.



1+2

Calculate volume of 4.5g of H ₂ at STP by using mole-volume relationship.	03
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First Annual 2025 | Section A Q1 | 1 mark

Amount of salt obtained in a reaction between acid and base is 250g. Having theoretical yield 500g, percentage yield is:	45%	50%	25%	35%
Which pair has the same electronic				

First Annual 2025 | Section A Q5 | 1 mark

The volume occupied by Nitrogen gas (N ₂) having number of moles 2.75 at STP is:	56.64 dm ³	45.46 dm ³	61.64 dm ³	3.89 dm ³
Electrons in				

First Annual 2025 | Section B Q2(i) | 3 marks

(i) Calculate mass of positive and negative ions produced when 3.26×10^{22} molecules of CaCl ₂ were dissolved in solution.	03
What is the effect of catalyst on the following:	

First Annual 2025 | Section B Q2(ix) | 3 marks

What is the limiting reactant? How does it control the quantity of the product formed?	2+1
What is critical solution temperature? Explain by	

First Annual 2025 | Section C Q6 | 7 marks

Q.6	Low Temperature or High Pressure The percentage yield of the following reaction is 76% $2Al + 3Cl_2 \longrightarrow 2AlCl_3$ How many grams of AlCl₃ will be obtained from 36.5g of Aluminum metal?	07
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Second Annual 2025 | Section A Q1 | 1 mark

1. Which component determines the maximum amount of product formed in a reaction?	Excess reactant	Limiting reactant	Catalyst	Solvent	☐	☐	☐	☐
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Second Annual 2025 | Section B Q2(i) | 3 marks

(i) What volume of SO ₂ at STP is produced on heating 9.7g of ZnS (Zn=65g/mol)	03
$2ZnS + 3O_2 \rightarrow 2ZnO + 2SO_2$	

Second Annual 2025 | Section B Q2(ii) | 3 marks

(ii) Calculate the mass of Nitrogen gas if it occupies 1dm ³ volume at STP.	03
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Q.5	Calculate the amount of excess reactant which is left behind when 50g of sodium reacts with 100g of water according to given equation: $2Na + 2H_2O \rightarrow 2NaOH + H_2$	06
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When 150 g of Mg is treated with dilute hydrochloric acid, what volume of hydrogen gas can be collected at STP. HCl (dil) is in excess. $Mg_{(s)} + 2HCl_{(aq)} \rightarrow MgCl_{2(aq)} + H_{2(g)}$	03
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The experimental yield is mostly less than the theoretical yield? What are the reasons?	03
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20 g of H_2SO_4 on dissolving water completely ionizes. Calculate: No. of H_2SO_4 molecules
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Q.3	20 g of H_2SO_4 on dissolving water completely ionizes. Calculate: a. No. of H_2SO_4 molecules
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Q.3	20 g of H_2SO_4 on dissolving water completely ionizes. Calculate: a. No. of H_2SO_4 molecules b. No. of H^+ and SO_4^{2-} ions
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Q.3	20 g of H_2SO_4 on dissolving water completely ionizes. Calculate: a. No. of H_2SO_4 molecules b. No. of H^+ and SO_4^{2-} ions c. Mass of individual ions
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(i)	A sample of water contains 2.5 g of chlorine gas in it. Determine the volume of this chlorine at STP.	03
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(ii)	Justify that a limiting reactant controls the quantity of the product formed in a reaction.	03
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