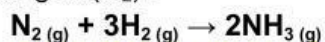


Problem 1: What volume of nitrogen gas (N₂) would be completely consumed in the reaction with 30.80 g of hydrogen gas (H₂)?



Step 1: Based on the units in the problems, select the correct conversion factor(s) that must be used to solve the problem.

1 mol N ₂ = 3 mol H ₂	1 mol N ₂ = 2 mol NH ₃	3 mol H ₂ = 2 mol NH ₃
1 mol N ₂ = 28.01 g N ₂	1 mol H ₂ = 2.016 g H ₂	1 mol NH ₃ = 17.034 g NH ₃
1 mol N ₂ = 6.022*10 ²³ molecules N ₂	1 mol H ₂ = 6.022*10 ²³ molecules H ₂	
1 mol N ₂ = 22.4 Liters N ₂	1 mol H ₂ = 22.4 Liters H ₂	

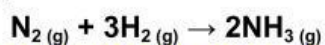
Step 2: Plug in the correct conversion factors into the T-chart so that the units along the diagonal cancel.

30.80 g H₂

Step 3: Use desmos to obtain your final answer.

ANSWER:

Problem 2: How many moles of hydrogen gas (H₂) are required to react completely with 0.75 moles of nitrogen gas (N₂)?



Step 1: Based on the units in the problems, select the correct conversion factor(s) that must be used to solve the problem.

1 mol N ₂ = 3 mol H ₂	1 mol N ₂ = 2 mol NH ₃	3 mol H ₂ = 2 mol NH ₃
1 mol N ₂ = 28.01 g N ₂	1 mol H ₂ = 2.016 g H ₂	1 mol NH ₃ = 17.034 g NH ₃
1 mol N ₂ = 6.022*10 ²³ molecules N ₂	1 mol H ₂ = 6.022*10 ²³ molecules H ₂	
1 mol N ₂ = 22.4 Liters N ₂	1 mol H ₂ = 22.4 Liters H ₂	

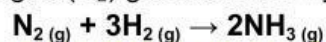
Step 2: Plug in the correct conversion factors into the T-chart so that the units along the diagonal cancel.

0.75 mol N₂

Step 3: Use desmos to obtain your final answer.

ANSWER:

Problem 3: How many moles of ammonia (NH₃) would be produced from the reaction of 2.56*10²³ molecules of nitrogen gas (N₂) given excess hydrogen gas (H₂)?



Step 1: Based on the units in the problems, select the correct conversion factor(s) that must be used to solve the problem.

1 mol N ₂ = 3 mol H ₂	1 mol N ₂ = 2 mol NH ₃	3 mol H ₂ = 2 mol NH ₃
1 mol N ₂ = 28.01 g N ₂	1 mol H ₂ = 2.016 g H ₂	1 mol NH ₃ = 17.034 g NH ₃
1 mol NH ₃ = 6.022*10 ²³ molecules NH ₃	1 mol N ₂ = 6.022*10 ²³ molecules N ₂	
1 mol NH ₃ = 22.4 Liters NH ₃	1 mol N ₂ = 22.4 Liters N ₂	

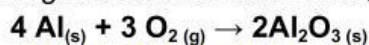
Step 2: Plug in the correct conversion factors into the T-chart so that the units along the diagonal cancel.

2.56*10²³ molecules N₂

Step 3: Use desmos to obtain your final answer.

ANSWER:

Problem 4: How many moles of aluminum oxide (Al₂O₃) can be produced from 12.8 moles of oxygen gas (O₂) reacting with excess aluminum (Al)?



Step 1: Based on the units in the problems, select the correct conversion factor(s) that must be used to solve the problem.

4 mol Al = 3 mol O ₂	4 mol Al = 2 mol Al ₂ O ₃	3 mol O ₂ = 2 mol Al ₂ O ₃
1 mol Al = 26.98 g Al	1 mol O ₂ = 32 g O ₂	1 mol Al ₂ O ₃ = 101.96 g Al ₂ O ₃
1 mol O ₂ = 6.022*10 ²³ molecules O ₂	1 mol Al ₂ O ₃ = 6.022*10 ²³ particles of Al ₂ O ₃	
1 mol NH ₃ = 22.4 Liters O ₂	1 mol Al = 6.022*10 ²³ atoms of Al	

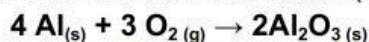
Step 2: Plug in the correct conversion factors into the T-chart so that the units along the diagonal cancel.

12.8 mol O₂

Step 3: Use desmos to obtain your final answer.

ANSWER:

Problem 5: What volume of oxygen gas (O₂) would be required to react with excess aluminum (Al) to produce 1.35 moles of aluminum oxide (Al₂O₃)?



Step 1: Based on the units in the problems, select the correct conversion factor(s) that must be used to solve the problem.

4 mol Al = 3 mol O ₂	4 mol Al = 2 mol Al ₂ O ₃	3 mol O ₂ = 2 mol Al ₂ O ₃
1 mol Al = 26.98 g Al	1 mol O ₂ = 32 g O ₂	1 mol Al ₂ O ₃ = 101.96 g Al ₂ O ₃
1 mol O ₂ = 6.022*10 ²³ molecules O ₂	1 mol Al ₂ O ₃ = 6.022*10 ²³ particles of Al ₂ O ₃	
1 mol O ₂ = 22.4 Liters O ₂	1 mol Al = 6.022*10 ²³ atoms of Al	

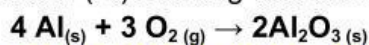
Step 2: Plug in the correct conversion factors into the T-chart so that the units along the diagonal cancel.

1.35 mol Al₂O₃

Step 3: Use desmos to obtain your final answer.

ANSWER:

Problem 6: How many grams of aluminum oxide (Al₂O₃) would be produced from the reaction of 0.25 grams of aluminum (Al) reacting with excess oxygen gas (O₂)?



Step 1: Based on the units in the problems, select the correct conversion factor(s) that must be used to solve the problem.

4 mol Al = 3 mol O ₂	4 mol Al = 2 mol Al ₂ O ₃	3 mol O ₂ = 2 mol Al ₂ O ₃
1 mol Al = 26.98 g Al	1 mol O ₂ = 32 g O ₂	1 mol Al ₂ O ₃ = 101.96 g Al ₂ O ₃
1 mol O ₂ = 6.022*10 ²³ molecules O ₂	1 mol Al ₂ O ₃ = 6.022*10 ²³ particles of Al ₂ O ₃	
1 mol O ₂ = 22.4 Liters O ₂	1 mol Al = 6.022*10 ²³ atoms of Al	

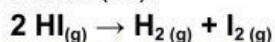
Step 2: Plug in the correct conversion factors into the T-chart so that the units along the diagonal cancel.

0.25 g Al

Step 3: Use desmos to obtain your final answer.

ANSWER:

Problem 7: How many grams of iodine gas (I_2) would be produced from the complete combustion of 8.76 L of hydrogen iodide (HI)?



Step 1: Based on the units in the problems, select the correct conversion factor(s) that must be used to solve the problem.

2 mol HI = 1 mol H_2	2 mol HI = 1 mol I_2	1 mol H_2 = 1 mole I_2
1 mol HI = 127.908 g HI	1 mol H_2 = 2.016 g O_2	1 mol I_2 = 253.8 g I_2
1 mol HI = 6.022×10^{23} molecules HI	1 mol I_2 = 6.022×10^{23} molecules I_2	
1 mol HI = 22.4 Liters HI	1 mol I_2 = 22.4 L I_2	

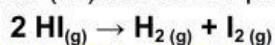
Step 2: Plug in the correct conversion factors into the T-chart so that the units along the diagonal cancel.

8.76 L HI

Step 3: Use desmos to obtain your final answer.

ANSWER:

Problem 8: How many moles of hydrogen gas (H_2) will be produced in this reaction when 34.5 moles of hydrogen iodide (HI) are decomposed?



Step 1: Based on the units in the problems, select the correct conversion factor(s) that must be used to solve the problem.

2 mol HI = 1 mol H_2	2 mol HI = 1 mol I_2	1 mol H_2 = 1 mole I_2
1 mol HI = 127.908 g HI	1 mol H_2 = 2.016 g O_2	1 mol I_2 = 253.8 g I_2
1 mol HI = 6.022×10^{23} molecules HI	1 mol I_2 = 6.022×10^{23} molecules I_2	
1 mol HI = 22.4 Liters HI	1 mol I_2 = 22.4 L I_2	

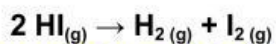
Step 2: Plug in the correct conversion factors into the T-chart so that the units along the diagonal cancel.

34.5 mol HI

Step 3: Use desmos to obtain your final answer.

ANSWER:

Problem 9: How many moles of hydrogen iodide (HI) are required to produce 13.5 L of hydrogen gas (H₂)



Step 1: Based on the units in the problems, select the correct conversion factor(s) that must be used to solve the problem.

2 mol HI = 1 mol H ₂	2 mol HI = 1 mol I ₂	1 mol H ₂ = 1 mole I ₂
1 mol HI = 127.908 g HI	1 mol H ₂ = 2.016 g O ₂	1 mol I ₂ = 253.8 g I ₂
1 mol HI = 6.022*10 ²³ molecules HI	1 mol I ₂ = 6.022*10 ²³ molecules I ₂	
1 mol HI = 22.4 Liters HI	1 mol H ₂ = 22.4 L H ₂	

Step 2: Plug in the correct conversion factors into the T-chart so that the units along the diagonal cancel.

13.5 L H₂

Step 3: Use desmos to obtain your final answer.

ANSWER: