

Solving Stoichiometry Problem

Step-by-Step

What is Stoichiometry

- ▶ Stoichiometry is the study of the relationships or ratios between two or more substances undergoing a physical or chemical change

We will be taking steps to solve the different equations

- ▶ The type of problem we will look at is solving for a Gram to Gram, also known as mass to mass Stoichiometry problem. Lets start with the problem.



If you start with 10.0gm of Lithium hydroxide, how many grams of lithium bromide will be produced?

Solving Stoichiometry Problems

Step 1. Balancing the Equation

A balanced equation has equal numbers of each type of atom on each side of the equation.

- ▶ Chemical equations usually do not come already balanced. Making sure they are balanced must be done before the equation can be used in any chemically meaningful way.

- ▶ So we need to look at our problem and make sure that our equation is balanced



In this particular example, the equation was balanced, but you need to make sure otherwise your answer will not be correct.

Step 2: Find the Given

- ▶ If you start with 10.0gm of Lithium hydroxide, how many grams of lithium bromide will be produced?

After reading the equation again, find what is Given

- ▶ We are given
 - ▶ 10.0 gm of Lithium
- ▶ We need
 - ▶ How many grams of lithium bromide will be produce

Step 3: Look for the ratio of moles

- ▶ Look for the Ratio of moles in the equation
- ▶ After the equation is balanced, the coefficient basically is saying that that is how many moles of that substance is needed to make the reaction

- ▶ If we have: $\text{LiOH} + \text{HBr} \rightarrow \text{LiBr} + \text{H}_2\text{O}$
- ▶ Basically what is being said is that you need: 1 LiOH + 1HBr to make 1 LiBr + 1 H₂O
- ▶ These coefficients make up the mole ratio
 - ▶ 1: 1 : 1: 1
- ▶ So it takes 1 mole of LiOH and 1 moles of HBr to make 1 moles of LiBr and 1 mole of H₂O

Step 4: Lets Set up the Equation

The problem states If you start with 10.0gm of Lithium hydroxide, how many grams of lithium bromide will be produced?

- ▶ So lets set up the problem :
- ▶ We are given 10gm LiOH we are looking for grams of LiBr.
- ▶ In order to solve this we need to find the Molar Mass of LiOH to get rid of grams of LiOH (I will round to the nearest whole number)

Li-7

O-16

H-1 Add them up you get

24gm of LiOH

- ▶ Set up the T-Chart

10 gm LiOH	
	24gm LiOH

Step 4: Lets Set up the Equation

The problem states If you start with 10.0gm of Lithium hydroxide, how many grams of lithium bromide will be produced?

- ▶ We know that 1mole of any molecule is equal to the molar mass of that molecule:
- ▶ So on top of the 24gm of LiOH, I will have 1mole of LiOH
- ▶ But I need to solve for LiBr, so I need to cancel my mole of LiOH

- ▶ Set up the T-Chart

10 gm LiOH	1 mol LiOH
	24gm LiOH

Step 5: Look at my Mole Ratio

The problem states If you start with 10.0gm of Lithium hydroxide, how many grams of lithium bromide will be produced?

- ▶ As stated I need to solve for LiBr, so I need to cancel my mole of LiOH
- ▶ So now I will look at my mole ratio
 - ▶ $1\text{LiOH} + 1\text{HBr} \rightarrow 1\text{LiBr} + 1\text{H}_2\text{O}$
 - ▶ 1: 1: 1: 1 →
- ▶ I have 1 mole of LiOH based off my ratio
- ▶ I place that on the bottom so that I can cancel LiOH
- ▶ Then I look at what I need, I need grams of LiBr
- ▶ But I have 1 mole of LiBr so I can place that on top

- ▶ Set up the T-Chart

10 gm LiOH	1 mol LiOH	1 mol of LiBr
	24gm LiOH	1mol LiOH

Step 5: Look at my Mole Ratio

The problem states If you start with 10.0g of Lithium hydroxide, how many grams of lithium bromide will be produced?

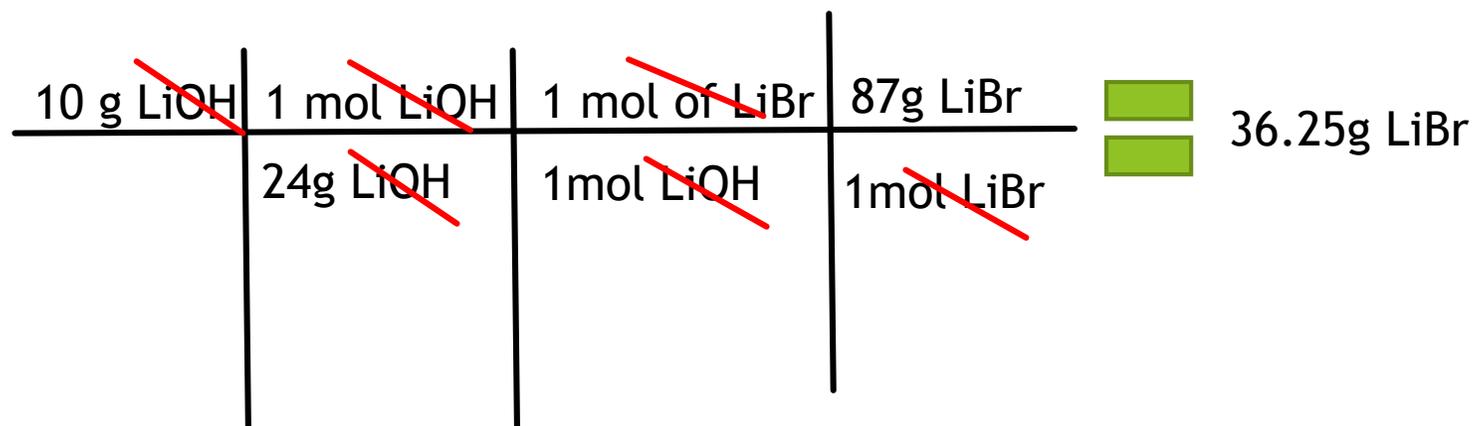
- ▶ I need to solve for grams of LiBr, I know I can place that on top, again using my mole rules with molar mass, I have 1mol of LiBr and then I take the Molar Mass of LiBr
- ▶ Li-7
- ▶ Br-80
- ▶ Add those up and I get 87g of LiBr
- ▶ Put my moles on the bottom to cancel

▶ Set up the T-Chart

10 g LiOH	1 mol LiOH	1 mol of LiBr	87g LiBr
	24g LiOH	1mol LiOH	1mol LiBr

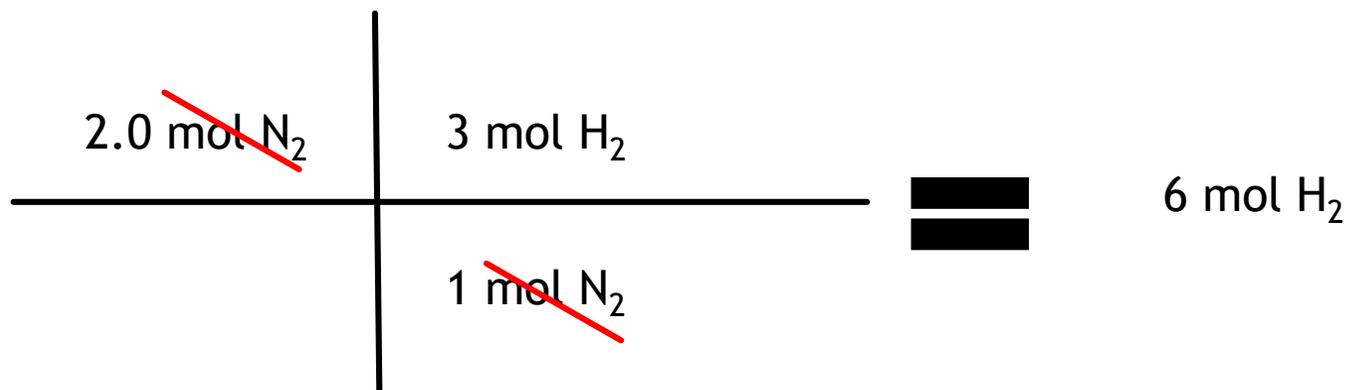
Step 6: Cancel Units and Do the Math

- Set up the T-Chart



Step 4: Cancel the units and solve the equation

► Cancel Units



* solve equation