

# The BCA Method in Stoichiometry

# Step 1- Balance the equation

Hydrogen sulfide gas, which smells like rotten eggs, burns in air to produce sulfur dioxide and water. How many moles of oxygen gas would be needed to completely burn 2.4 moles of hydrogen sulfide?



Before:

Change

After

## Step 2: fill in the before line



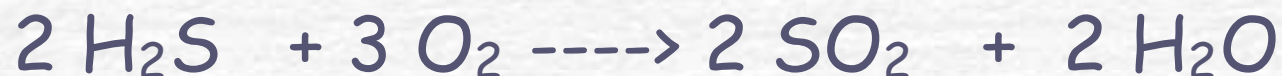
Before:    2.4        xs                    0                    0

Change

After

Assume more than enough  $\text{O}_2$  to react

## Step 3: use ratio of coefficients to determine change



Before: 2.4      xs                      0                      0

Change -2.4    -3.6    +2.4    +2.4

After

Reactants are consumed (-), products  
accumulate (+)

# Step 4: Complete the table



Before:	2.4	xs	0	0
Change	-2.4	-3.6	+2.4	+2.4
		After	0	xs
	<hr/>			2.4
	2.4			



# Only moles go in the BCA table

The balanced equation deals with *how many*, not *how much*.

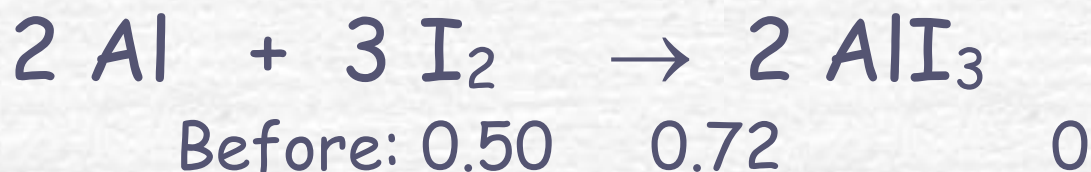
If given mass of reactants for products, convert to moles first, then use the table.

# Limiting reactant problems

Distinguish between what you start with and what reacts.

When 0.50 mole of aluminum reacts with 0.72 mole of iodine to form aluminum iodide, how many moles of the excess reactant will remain?

How many moles of aluminum iodide will be formed?



Change \_\_\_\_\_

After

# Limiting reactant problems

Guess which reactant is used up first, then check



Before: 0.50 0.72 0

Change -0.50 -0.75

After

It's clear that there's not enough  $\text{I}_2$  to react with all the Al.



# Limiting reactant problems

Now that you have determined the limiting reactant, complete the table, then solve for the desired answer.



Before: 0.50   0.72   0

Change -0.48 -0.72   +0.48

After 0.02   0   0.48

# Complete calculations on the side

In this case, desired answer is in moles

If mass is required, convert moles to grams in the usual way

$$3.6 \text{ moles O}_2 \times \frac{32.0\text{g}}{1 \text{ mole}} = 115 \text{ g O}_2$$