

Bell Work, Dec 2 - 5, 2013

Balancing Equations, Moles,
Stoichiometry,

Bell Work, Monday, Dec 2, 2013

1. What is the mass of oxygen atoms in 250 g of nitric acid, HNO_3 ?

2. What would be the mass of oxygen molecules (O_2)?

1. Mass (g) $\text{HNO}_3 \rightarrow$ Moles $\text{HNO}_3 \rightarrow$ Moles O \rightarrow mass (g) O

Mass (g) \rightarrow moles

Molar mass HNO_3 ? 63.01g HNO_3

$$\underline{250 \text{ g } \text{HNO}_3} \times \frac{1 \text{ mol } \text{HNO}_3}{63.01 \text{ g } \text{HNO}_3} = \underline{3.967 \text{ mol } \text{HNO}_3}$$

Moles $\text{HNO}_3 \rightarrow$ Moles O

1 mole HNO_3 ? = 3 moles O (for every 1 HNO_3 , there are 3 oxygens)

$$\underline{3.967 \text{ mol } \text{HNO}_3} \times \frac{3 \text{ mol O}_1}{1 \text{ mol } \text{HNO}_3} = \underline{11.901 \text{ mol O}}$$

Moles O \rightarrow mass (g) O

1 mol O = 16 g O

$$\underline{11.901 \text{ mol O}} \times \frac{16 \text{ g O}_1}{3 \text{ mol O}_1} = \underline{190.416 \text{ g O}} \text{ or } 190 \text{ g O}$$

Bell Work, Monday, Dec 2, 2013

2. What is the mass of oxygen molecules (O_2) 250 g of nitric acid, HNO_3 if $HNO_3 \rightarrow H_2 + N_2 + O_2$

1. Mass (g) $HNO_3 \rightarrow$ Moles $HNO_3 \rightarrow$ Moles O \rightarrow mass (g) O

Mass (g) \rightarrow moles

Molar mass HNO_3 ? _____

_____ x _____ = _____

Moles $HNO_3 \rightarrow$ Moles O_2

1 mole HNO_3 ? = ? moles O_2 (for every 1 HNO_3 , there are ? oxygen's)

We need a balanced equation.

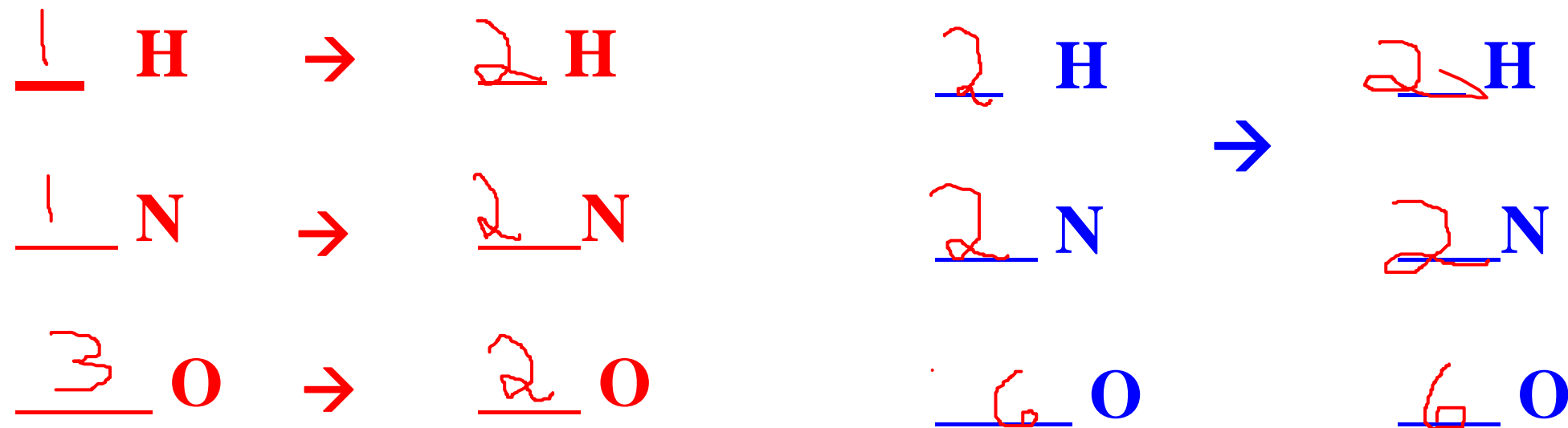
3. Is $HNO_3 \rightarrow H_2 + N_2 + O_2$ a balanced equation?

NO

Bell Work, Monday, Dec 2, 2013

3. Is $\text{HNO}_3 \rightarrow \text{H}_2 + \text{N}_2 + \text{O}_2$ a balanced equation?

The equation is balance if we have the same numbers of atoms on both sides of the arrow in the smallest ratio.



Bell Work, Tuesday Dec 3

1. Balance each of the following.

Use the lowest possible coefficients



2 8 1

N: 1 H: 3

H: 2 S: 1

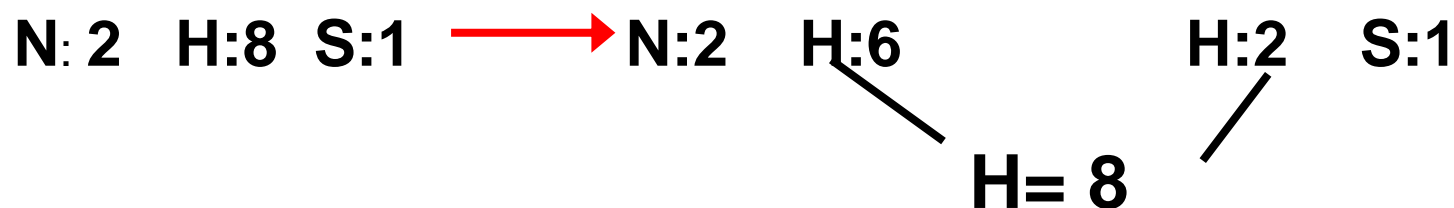
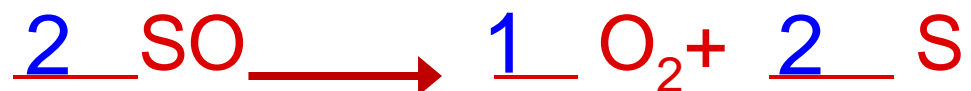
H = 5



Bell Work, Tuesday, Dec 3

1. Balance each of the following.

Use the lowest possible coefficients



Bell Work, Tuesday, Dec 3, 2013

2. What is the mass of oxygen molecules (O_2) 250 g of nitric acid, HNO_3 if $\underline{2} HNO_3 \rightarrow \underline{1} H_2 + \underline{1} N_2 + \underline{3} O_2$

1. Mass (g) $HNO_3 \rightarrow$ Moles $HNO_3 \rightarrow$ Moles $O_2 \rightarrow$ mass (g) O_2

Mass (g) \rightarrow moles

Molar mass HNO_3 ? 63.01g HNO_3

$$\underline{250 \text{ g } HNO_3} \times \frac{\underline{1 \text{ mol } HNO_3}}{63.01 \text{ g } HNO_3} = \underline{3.967 \text{ mol } HNO_3}$$

Moles $HNO_3 \rightarrow$ Moles O_2

for every 2 moles of HNO_3 , there are 3 moles of oxygens, O_2)

$$\underline{3.967 \text{ mol } HNO_3} \times \frac{3 \text{ mol } O_2}{2 \text{ mol } HNO_3} = \underline{5.9505 \text{ mol } O_2}$$

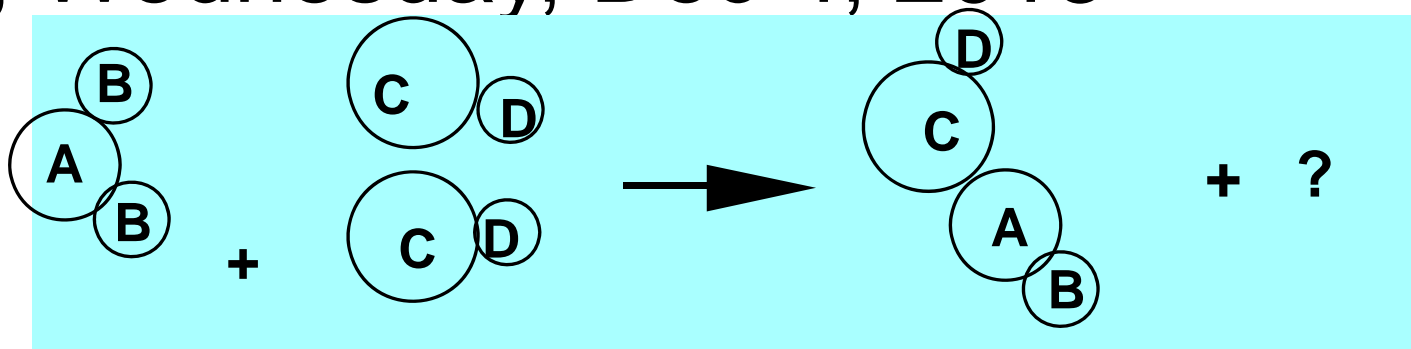
Moles $O_2 \rightarrow$ mass (g) O_2

1 mol $O_2 = \underline{32 \text{ g } O_2}$

$$\underline{5.9505 \text{ mol } O_2} \times \frac{32 \text{ g } O_2}{1 \text{ mol } O_2} = \underline{190.446 \text{ g } O_2} \text{ or } 190 \text{ g } O_2$$

Bell Work, Wednesday, Dec 4, 2013

Draw the particle diagram

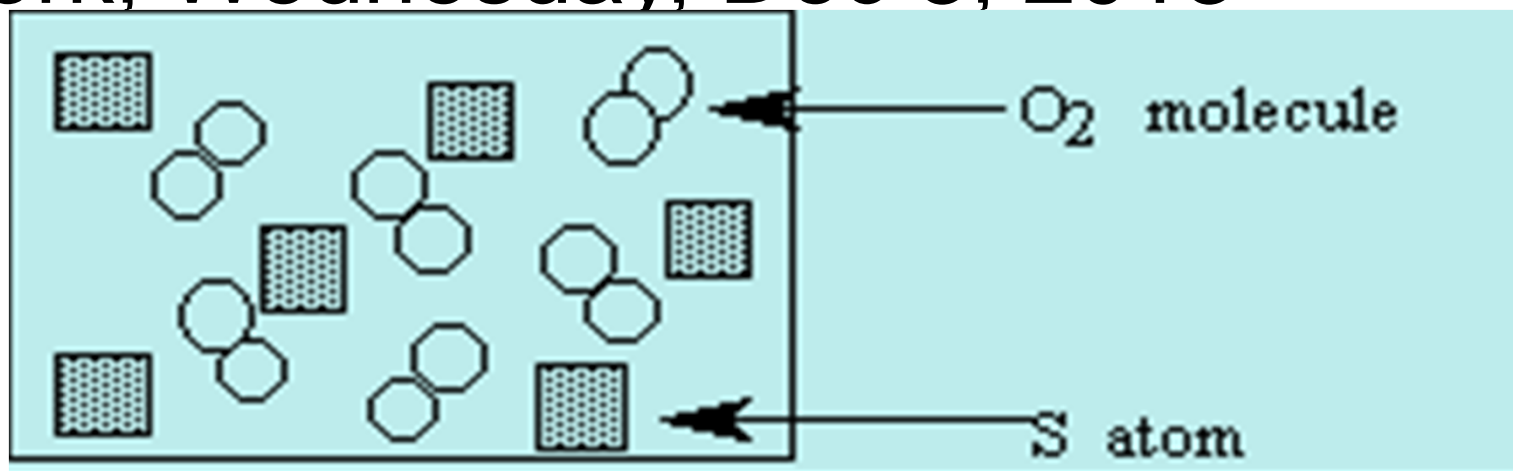


1. What should be the total number of D atoms on the right side of the equation? **2 atoms of D**
2. What is the formula of the missing product molecule? **BCD**
3. What are particles on the left side of the arrow called? **Reactants** On the right they called **Products**
4. Write the completed chemical equation for the reaction pictured.
 $AB_2 + 2 CD \rightarrow ABCD + BCD$

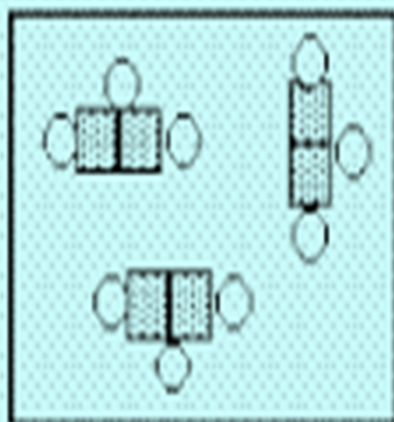
Bell Work, Wednesday, Dec 3, 2013

5.

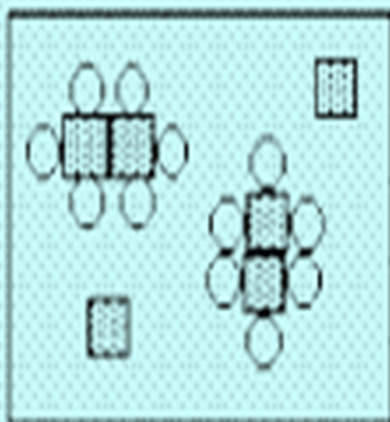
Draw the
particle
diagram



Which diagram shows the results after the mixture reacts as completely as possible according to the equation: $2\text{S} + 3\text{O}_2 \rightarrow 2\text{SO}_3$



(a)



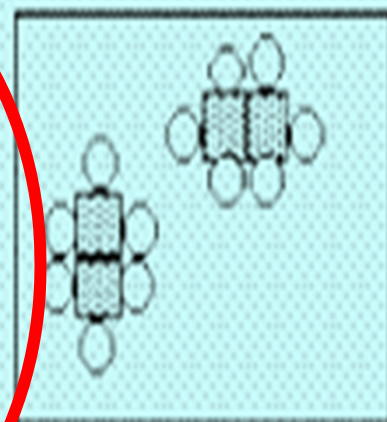
(b)



(c)



(d)



(e)

Bell Work, 5th, Thursday, Dec 5, 2013

1. Sulfur will react with oxygen gas to produce sulfur trioxide.
How many moles of oxygen gas are needed to react with 3.0 mole of sulfur so there is no sulfur remaining (completely react)? How many moles of sulfur trioxide will form?



Before 3 ? 0

Change

After

_____ x _____ = _____

_____ x _____ = _____

Bell Work, 5th, Thursday, Dec 5, 2013

1. Sulfur will react with oxygen gas to produce sulfur trioxide.

How many moles of oxygen gas are needed to react with 3.0 mole of sulfur so there is no sulfur remaining (completely react)? How many moles of sulfur trioxide will form?



Before 3 3 0

Change -3 -4.5 ?

After 0 -1.5 ?

Change: Amount of O_2 needed to react with 3 mol of S =

$$\underline{3 \text{ mol S}} \times \frac{3 \text{ mol O}_2}{2 \text{ mol S}} = \underline{4.5 \text{ mol O}_2}$$

$$\underline{3 \text{ mol S}} \times \frac{2 \text{ mol SO}_3}{2 \text{ mol S}} = \underline{3 \text{ mol SO}_3} \text{ if you had } 4.5 \text{ mol O}_2$$

Bell Work, Thursday, Dec 5, 2013

2. How many moles of sulfur trioxide will form if there are 6 moles of sulfur and 6 moles of oxygen gas?



Before **6** **6** **0**

Change **- 4** **- 6** **+ 4**

After **2** **0** **4**

$$\underline{6 \text{ mol S}} \times \frac{3 \text{ mol O}_2}{2 \text{ Mol S}} = \underline{9 \text{ mol O}_2}$$

$$\underline{6 \text{ mol O}_2} \times \frac{2 \text{ Mol S}}{3 \text{ mol O}_2} = \underline{4 \text{ mol S}}$$

$$\underline{6 \text{ mol O}_2} \times \frac{2 \text{ Mol SO}_3}{3 \text{ mol O}_2} = \underline{4 \text{ mol SO}_3}$$