

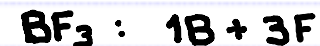
### 4.3 What Is a Mole and How Do We Use It to Calculate Mass Relationships.

#### Example 1

How many **ATOMS** of fluorine are present in 3.30 moles of **BF<sub>3</sub>**?

$$N = 6.023 \times 10^{23} \text{ mol}^{-1}$$

$$\frac{3.30 \text{ mol BF}_3}{1} \left| \frac{3 \text{ F}}{1 \text{ BF}_3} \right. = 9.90 \text{ mol F}$$



$$\frac{9.90 \text{ mol F}}{1} \left| \frac{6.023 \times 10^{23} \text{ atoms}}{1 \text{ mol}} \right. = 5.96 \times 10^{24} \text{ atoms F}$$

$$6.023 \times 10^{23} \text{ mol}^{-1} = \frac{6.023 \times 10^{23}}{1 \text{ mol}}$$

## 4.3 What Is a Mole and How Do We Use It to Calculate Mass Relationships.

### Example 2

How many **MOLES** of fluorine are present in  $3.09 \times 10^{22}$  molecules of  $\text{BF}_3$ ?

$$N = 6.023 \times 10^{23} \text{ mol}^{-1}$$

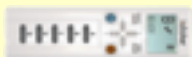
$$\frac{3.09 \times 10^{22} \text{ molecules BF}_3}{6.023 \times 10^{23} \text{ molecules}} \left| \frac{1 \text{ mol}}{6.023 \times 10^{23} \text{ molecules}} \right. = 0.0513 \text{ mol BF}_3$$

$$\frac{0.0513 \text{ mol BF}_3}{1 \text{ BF}_3} \left| \frac{3 \text{ F}}{1 \text{ BF}_3} \right. = 0.154 \text{ mol F}$$

### 5.3 What Is a Mole and How Do We Use It to Calculate Mass Relationships.

#### Example 3

How many **MOLES** of water are present in 5.41 grams of this compound ?



a) 0.1

b) 0.2

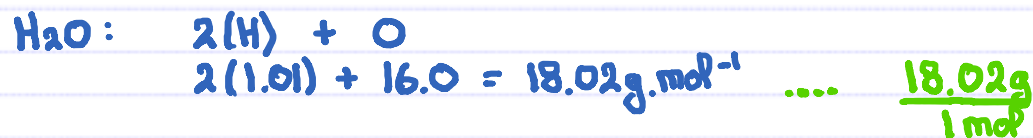
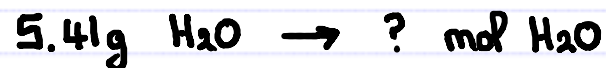
c) 0.3 ✓

d) 0.4

e) Help

O: 16.0

H: 1.01



$$\frac{5.41\text{g H}_2\text{O}}{18.02\text{g}} \Bigg| \frac{1\text{mol}}{18.02\text{g}} = 0.03 \text{ mol H}_2\text{O}$$

### 5.3 What Is a Mole and How Do We Use It to Calculate Mass Relationships.

#### Example 4

How many **Grams** of ethanol ( $\text{CH}_3\text{CH}_2\text{OH}$ ) are present in 0.61 moles of this compound?

C: 12.01

H: 1.01

O: 16.00



a) 46

b) 96

c) 28 ✓

d) Help

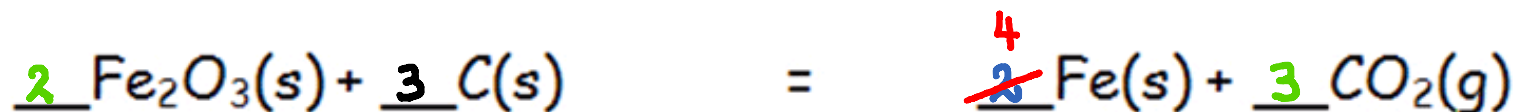
$$\text{CH}_3\text{CH}_2\text{OH} : 2(\text{C}) + 6(\text{H}) + \text{O}$$
$$2(12.01) + 6(1.01) + 16.00 = 46.08 \text{ g} \cdot \text{mol}^{-1} \quad \dots \quad \frac{46.08 \text{ g}}{1 \text{ mol}}$$

$$\frac{0.61 \text{ mol CH}_3\text{CH}_2\text{OH}}{1} \left| \frac{46.08 \text{ g}}{1 \text{ mol}} \right. = 28.1 \text{ g CH}_3\text{CH}_2\text{OH}$$

## 4.4 How Do We Balance Chemical Equations?

### Example 1

Balance the following chemical equation:



Reactants					✓
Fe	2	2	4	4	4
O	3	3	6	6	6
C	1	1	1	1	3

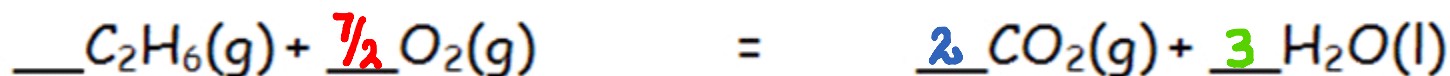
Products					✓
Fe	1	2	2	4	4
O	2	2	6	6	6
C	1	1	3	3	3



## 4.4 How Do We Balance Chemical Equations?

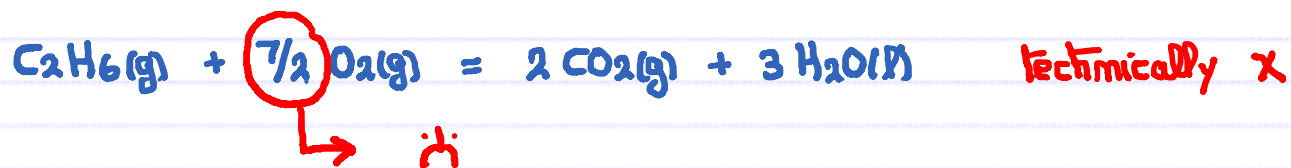
### Example 2

Balance the following chemical equation:



Reactants					✓
C	2	2	2	2	
H	6	6	6	6	
O	2	2	2	7	

Products					✓
C	1	2	2	2	
H	2	2	6	6	
O	3	5	7	7	



## 4.4 How Do We Balance Chemical Equations?

### Example 3



- a) 1
- b) 2
- c) 3
- d) 4
- e) 5

Balance the following chemical equation:



? What is taking you so long ??

## 4.4 How Do We Balance Chemical Equations?

### Example 3



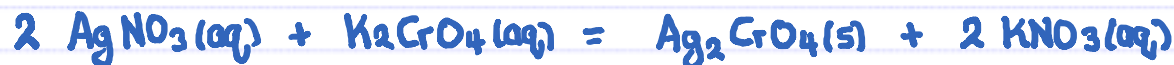
- a) 1 ✓      d) 4  
b) 2      e) 5  
c) 3

Balance the following chemical equation:



Reactants					
Ag	1	2	2 ✓		
NO <sub>3</sub>	1	2	2		
K	2	2	2		
CrO <sub>4</sub>	1	1	1		

Products					
Ag	2	2	2 ✓		
NO <sub>3</sub>	1	1	2		
K	1	1	2		
CrO <sub>4</sub>	1	1	1		



Polyatomic ions tend to remain intact ... when they do treat them as a single entity.