# Announcements – Lecture VI – Thursday, Sep 22nd

1. **First Lab – Saturday, September 24th … 1-4pm … ISB 155/160 (A-E)**

   *a) Read the Lab Policy prior to the this lab.*

   *b) Print lab prior to coming to lab -- use the 'Print Friendly Version' located on the top left hand side of the page – this is the version that contains the 'Data Sheet' that you will hand in upon completing the lab.*

   *c) Review the sample quiz on class web site – a short 6 question quiz will be administered at the start of the lab – questions taken from the sample questions.*

2. 

**iClicker:**
*Choose any letter: A-E*

## 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 **$BF_3$**?

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

$$3.09 \times 10^{22}\ \text{molecules } BF_3 \left| \frac{1\ \text{mol}}{6.023 \times 10^{23}\ \text{molecules}} \right. = 0.0513\ \text{mol } BF_3$$

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

$$0.0513\ \text{mol } BF_3 \left| \frac{3\ F}{1\ BF_3} \right. = 0.154\ \text{mol } F$$

$BF_3$ : 1B + 3F

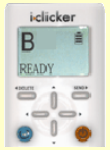
## 5.3 What Is a Mole and How Do We Use It to Calculate Mass Relationships.

### Example 3

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

O: 16.0

H: 1.01




a) 0.1 b) 0.2 c) 0.3 ✓ d) 0.4 e) Help

$5.41\ g\ H_2O \rightarrow ?\ mol\ H_2O$

$H_2O$ : $2(H) + O$

$2(1.01) + 16.0 = 18.02\ g.mol^{-1}$ ... $\frac{18.02\ g}{1\ mol}$

$$5.41\ g\ H_2O \left| \frac{1\ mol}{18.02\ g} \right. = 0.3\ mol\ H_2O$$

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

### Example 4

How many Grams of ethanol ($CH_3CH_2OH$) are present in 0.61 moles of this compound ?


a) 46 b) 96 c) 28 ✓ d) Help

C : 12.01
H : 1.01
O : 16.00

$CH_3CH_2OH$ : $2(C) + 6(H) + O$

$2(12.01) + 6(1.01) + 16.00 = 46.08\ g.mol^{-1}$ ... $\frac{46.08\ g}{1\ mol}$

$$0.61\ mol\ CH_3CH_2OH \left| \frac{46.08\ g}{1\ mol} \right. = 28.1\ g\ CH_3CH_2OH$$

## 4.4 How Do We Balance Chemical Equations?

### Example 1

Balance the following chemical equation:

$$\underline{2}\ Fe_2O_3(s) + \underline{3}\ C(s) = \underline{4}\ Fe(s) + \underline{3}\ CO_2(g)$$

| 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 |

$$2\ Fe_2O_3(s) + 3\ C(s) = 4\ Fe(s) + 3\ CO_2(g)$$

## Example 2

Balance the following chemical equation:

$$\_\_C_2H_6(g) + \frac{7}{2}\,O_2(g) = 2\,CO_2(g) + 3\,H_2O(l)$$

| 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 | |

$C_2H_6(g) + \frac{7}{2}O_2(g) = 2\,CO_2(g) + 3\,H_2O(l)$

$\times 2$

$2\,C_2H_6(g) + 7\,O_2(g) = 4\,CO_2(g) + 6\,H_2O(l)$ ✓

## 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:

$$\_\_AgNO_3(aq) + \_\_K_2CrO_4(aq) = \_\_Ag_2CrO_4(s) + \_\_KNO_3(aq)$$

? What is taking so long !!

## 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:

$$\underline{2}\ AgNO_3(aq) + \underline{\ \ }\ K_2CrO_4(aq) = \underline{?}\ Ag_2CrO_4(s) + \underline{2}\ KNO_3(aq)$$

| Reactants | | | ✓ | | |
|---|---|---|---|---|---|
| Ag | 1 | 2 | 2 | | |
| $NO_3$ | 1 | 2 | 2 | | |
| K | 2 | 2 | 2 | | |
| $CrO_4$ | 1 | 1 | 1 | | |

| Products | | | ✓ | | |
|---|---|---|---|---|---|
| Ag | 2 | 2 | 2 | | |
| $NO_3$ | 1 | 1 | 2 | | |
| K | 1 | 1 | 2 | | |
| $CrO_4$ | 1 | 1 | 1 | | |

$$2\ AgNO_3(aq) + K_2CrO_4(aq) = Ag_2CrO_4(s) + 2\ KNO_3(aq)$$

Polyatomic ions ... when remaining intact ... treat as a single entity.