

**Summer Review****Station 1****(Ch 1) - MEASUREMENTS**

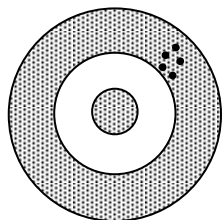
Write in the number of significant figures for each of the following measurements:

3 3.00 mL    3 0.00290 g    4 50.00 m    2 0.070 kg    1 400 L

Combine the masses 0.0562 kg, 124.213 g and 1635 mg. The answer should be reported as: 182.0 g  
 $56.2 \text{ g} + 124.213 \text{ g} + 1.635 \text{ g} = 182.048$  **round number off to largest digit with uncertainty... tenths**

You measure a 5.75 mL sample of mercury with a mass of 77.05 g. The measured density is 13.4 g/mL  
 density = mass/volume =  $77.05 \text{ g} / 5.75 \text{ mL} = 13.4 \text{ g/mL}$

Mercury's accepted density is  $13.53 \text{ g} \cdot \text{mL}^{-1}$ . The % error in your measurement is: 0.96 %  
 $100 \times (13.53 - 13.4) / 13.53 = 0.96 \%$



Is this person accurate? N  
**not on the bull's eye**

Is the person precise? Y  
**closely grouped**

**Summer Review****Station 2****(Ch 1) - MATTER**

This molecule contains 3 (C, H & O) elements and 12 atoms.

The molecular formula for this substance is: C<sub>3</sub>H<sub>6</sub>O<sub>3</sub>

*You may need to see the color version of this molecule to be certain.*

Calculate the number of seconds in 5.25 years using unit analysis: (1 year = 365.25 days)

$$5.25 \text{ years} \times \frac{365.25 \text{ days}}{1 \text{ year}} \times \frac{24 \text{ hours}}{1 \text{ day}} \times \frac{3600 \text{ sec}}{1 \text{ hour}} = 165677400 \text{ sec} = 166,000,000 \text{ sec} = 1.66 \times 10^8 \text{ sec}$$

A **calculator** displays the answer to a problem as **53.29841**

Report this answer to:

53.298      5 significant figures

53.3      3 significant figures

50      1 significant figure

# Summer Review

# Station 3

## (Ch 3) - MEASURING CHEMICALS

Calculate the molar mass of Ba(NO<sub>3</sub>)<sub>2</sub>.

$$\begin{aligned} \text{Ba: } & 137.33 \\ \text{N}_2: & 28.02 \\ \text{O}_6: & 96.00 \quad = 261.35 \text{ g/mol} \end{aligned}$$

Calculate the percent composition of each element in the following compound.

Ba(NO <sub>3</sub> ) <sub>2</sub>	Ba = $\frac{137.33}{261.35} \times 100 = 52.5\%$	N = $\frac{28.02}{261.35} \times 100 = 10.7\%$	O = $\frac{96.00}{261.35} \times 100 = 36.7\%$
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Write the formula for ionic compounds made from these ions:

Name	Cation	Anion	Formula
sodium phosphate	Na <sup>+</sup>	PO <sub>4</sub> <sup>3-</sup>	Na <sub>3</sub> PO <sub>4</sub>
stannic chloride	Sn <sup>4+</sup>	Cl <sup>-</sup>	SnCl <sub>4</sub>
aluminum hydroxide	Al <sup>3+</sup>	OH <sup>-</sup>	Al(OH) <sub>3</sub>
ammonium sulfate	NH <sub>4</sub> <sup>+</sup>	SO <sub>4</sub> <sup>2-</sup>	(NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub>

# Summer Review

# Station 4

## (Ch 3) - MOLE PROBLEMS

Solve the following mole problems:

How many molecules of CO<sub>2</sub> (MM = 44.0 g/mol) are in 17.75 grams of CO<sub>2</sub>?

$$17.75 \text{ g CO}_2 \times \frac{1 \text{ mole CO}_2}{44.0 \text{ g CO}_2} \times \frac{6.02 \times 10^{23} \text{ molecules CO}_2}{1 \text{ mole CO}_2} = 2.43 \times 10^{23} \text{ molecules CO}_2$$

What volume (in Liters) does 20.0 grams of butane, C<sub>4</sub>H<sub>10</sub>, occupy at STP? (MM C<sub>4</sub>H<sub>10</sub> = 58.14 g/mol)

$$20.0 \text{ g C}_4\text{H}_{10} \times \frac{1 \text{ mole C}_4\text{H}_{10}}{58.14 \text{ g C}_4\text{H}_{10}} \times \frac{22.4 \text{ L C}_4\text{H}_{10}}{1 \text{ mole C}_4\text{H}_{10}} = 7.71 \text{ L C}_4\text{H}_{10}$$

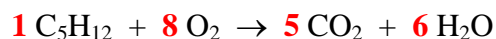
List the 7 diatomic elements:	H	N	O	F	Cl	Br	I
	H <sub>2</sub>	N <sub>2</sub>	O <sub>2</sub>	F <sub>2</sub>	Cl <sub>2</sub>	Br <sub>2</sub>	I <sub>2</sub>

# Summer Review

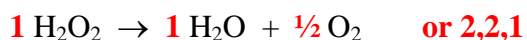
# Station 5

## (Ch 4) - REACTIONS

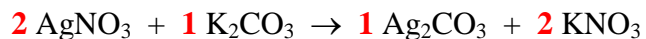
Balance these equations and classify their type (single replacement, double replacement, etc.)



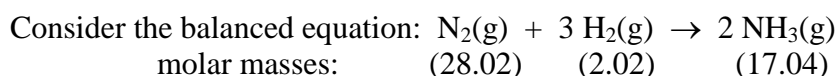
Classify this reaction: Combustion (Redox)



Classify this reaction: Decomposition (Redox)



Classify this reaction: Double Replacement



How many grams of  $\text{NH}_3(\text{g})$  is formed when 12.80 grams of  $\text{H}_2(\text{g})$  reacts with 55.25 grams of  $\text{N}_2(\text{g})$ ?

*Note: Two "Givens" signifies a Limiting Reactant Problem.*

$$12.80 \text{ g H}_2 \times \frac{1 \text{ mol H}_2}{2.02 \text{ g H}_2} \times \frac{2 \text{ mol NH}_3}{3 \text{ mol H}_2} \times \frac{17.04 \text{ g NH}_3}{1 \text{ mol NH}_3} = 71.98 \text{ g NH}_3$$

$$55.25 \text{ g N}_2 \times \frac{1 \text{ mol N}_2}{28.02 \text{ g N}_2} \times \frac{2 \text{ mol NH}_3}{1 \text{ mol N}_2} \times \frac{17.04 \text{ g NH}_3}{1 \text{ mol NH}_3} = 67.199 = \boxed{67.20 \text{ g NH}_3} \text{ (Smaller Answer is Correct)}$$

# Summer Review

# Station 6

## (Ch 4) - EMPIRICAL FORMULAS

*Empirical Formulas:*

A substance is 33.33% carbon, 7.47% hydrogen, and 59.20% oxygen.

What is its empirical formula?  $\text{C}_3\text{H}_8\text{O}_4$

Assume 100 g of substance:

$$33.33 \text{ g C} \times \frac{1 \text{ mole C}}{12.01 \text{ g C}} = \frac{2.775 \text{ mol C}}{2.775} = 1 \times 3 = 3$$

$$7.47 \text{ g H} \times \frac{1 \text{ mole H}}{1.01 \text{ g H}} = \frac{7.396 \text{ mol H}}{2.775} = 2.66 \times 3 = 8$$

$$59.20 \text{ g O} \times \frac{1 \text{ mole O}}{16.00 \text{ g O}} = \frac{3.700 \text{ mol O}}{2.775} = 1.33 \times 3 = 4$$

# Summer Review

# Station 7

## (Ch 5) - DRIVING FORCES

Circle the <b>precipitates</b> :	<b>PbI<sub>2</sub></b>	Ba(OH) <sub>2</sub>	<b>Ag<sub>2</sub>CO<sub>3</sub></b>	<b>CaF<sub>2</sub></b>	K <sub>2</sub> SO <sub>3</sub>	(NH <sub>4</sub> ) <sub>2</sub> S
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List the <b>strong acids</b> :	<b>HCl</b>	<b>HI</b>	<b>HBr</b>	<b>H<sub>2</sub>SO<sub>4</sub></b>	<b>HNO<sub>3</sub></b>	<b>HClO<sub>3</sub></b>	<b>HClO<sub>4</sub></b>	<b>HIO<sub>4</sub></b>
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Write the balanced molecular, ionic, and net ionic equation for:

*Solutions of acetic acid and sodium nitrite are mixed.*



*HNO<sub>2</sub> decomposes to gases, but you need 2 HNO<sub>2</sub> → H<sub>2</sub>O + NO + NO<sub>2</sub>... so double the above equation.*



# Summer Review

# Station 8

## (Ch 5) - REDOX REACTIONS

Write the balanced net ionic equation for:

*Aluminum metal is added to a solution of silver nitrate.*

*Al<sup>0</sup> metal must change... into the ion, Al<sup>3+</sup>*

*If Al's oxidation number increases, an oxidation number must also decrease... Ag<sup>+</sup> → Ag<sup>0</sup>*



What substance is being **oxidized**? Al Which **atom** is being **reduced**? Ag<sup>+</sup>

What is the **oxidizing agent**? AgNO<sub>3</sub>

What is the **oxidation number** of N in the nitrate ion, NO<sub>3</sub><sup>-</sup>

$$x + 3(-2) = -1$$

$$x = +5$$

When solutions of NaOH and HCl are added together, the mixture gets hot.

50.0 mL of 2.00 M NaOH and 50.0 mL of 2.00 M HCl are mixed.

Both solutions are at room temperature, 18.0°C, and the final temperature of the mixture is 32.0°C.

- a) Calculate the heat released by the reaction.

$$\begin{aligned}q &= m \cdot C \cdot \Delta T \\ &= (100. \text{ g}) (4.184 \text{ J/g} \cdot ^\circ\text{C}) (14.0^\circ\text{C}) = 5,857.6 \text{ J} = \mathbf{5.86 \text{ kJ}}\end{aligned}$$

- b) Calculate the moles of HCl formed.

$$n = \text{vol} \times \text{Molarity} = (0.050 \text{ L}) (2.00 \text{ M}) = \mathbf{0.100 \text{ mole H}_2\text{O formed}}$$

- c) Calculate the  $\Delta H$  of neutralization in kJ/mol.

$$\Delta H = 5.86 \text{ kJ} / 0.100 \text{ mol} = \mathbf{-58.6 \text{ kJ/mol}}$$