Chemistry Bell Work, March 26 – March 29

Mass and Volume 2:

Density & Mass & Volume Calculations, Percent Error, Percent Range, Density of a Gas, Density Particle Model

Chemistry Bell Work, Monday, 3/25/18, 5 Questions

1. What is an experimental value? Give an example.

An experimental value is a value you determined from measurements. Example: the mass & volume data in your lab book.

2. What is an "accepted value?"

It is the known accepted value of a substance and is found in reference sources. This value can be "looked up."

3. A handbook gives the density of calcium as 1.54 g/cm³. What is the percent error of a density calculation of 2.25 g/cm³ conducted from measurements of mass and volume?

$$Percent\ Error = \frac{|Accepted\ Value - Experimental\ Value|}{Accepted\ Value} x\ 100$$

$$Accepted\ Value = 1.54, \quad Experimental\ Value = 2.25$$

$$\%\ Error = \frac{|1.54 - 2.25|}{1.54} x\ 100 = \frac{|-0.71|}{1.54} x\ 100 = \frac{0.71}{1.54} x\ 100$$

Percent error = 46 .10%

4. Determine the Percent Range for the following densities:

– **6.2 g/cm^3, 7.0 g/cm^3, 7.3 g/cm^3**

$$\%\, range = \frac{Highest\ Value\ -\ Lowest\ Value}{Lowest\ Value}\ x\ 100$$

Highest value = 7.3 **Lowest Value = 6.2**

$$\%\, range = \frac{7.3\ -\ 6.2}{6.2}\ x\ 100 \quad = 17.7\%$$

5. Define Density

Density is the amount of mass that occupies 1 unit of volume. If our unit of volume is milliliters, then density is the amount of mass that occupies 1 mL. Mathematically: $Density = \frac{mass}{volume}$ **or** $D = \frac{m}{v}$

Example: 1 g of water occupies 1 mL. The density is 1 g per mL and is written $1\ \frac{g}{mL}$ **or 1 g/mL or** $\frac{1\ g}{1\ mL}$

Chemistry Bell Work, Tuesday, 3/27/18, 2 questions

1. The mass of a 5.00 mL sample of clay is 11 g. What is the density of the clay?

$$Density = \frac{mass}{volume} \quad \text{or} \quad D = \frac{m}{v}$$

$m = 11g$

$v = 5.00\ mL$

$$D = \frac{m}{v} = \frac{11g}{5.00\ mL} = 2.2\ \frac{g}{mL}$$

2. The density of aluminum is 2.70 g/cm³. What is the mass of a solid piece of aluminum with a volume of 1.50 cm³?

D = 2.70 g/cm³, V = 1.50 cm³, m= ?

$$D = \frac{m}{V} \quad \frac{2.70\ g/cm^3}{1} = \frac{m}{1.50\ cm^3} \quad = 4.05\ g$$

Or $m = D \bullet V$

$m = (2.70\ g/cm^3) \bullet (1.50\ cm^3)$ $= 4.05\ g$

Chemistry Bell Work, Wednesday, 3/28/18

1. What is the mass of 127 mL of iron? The density of iron = 7.87 g/mL

$m = D \bullet V$

D = 7.87 g/mL,

V = 127 mL,

m= ?

$m = 7.87 \frac{g}{\cancel{mL}} * 127 \cancel{mL} = 999\ g$

2. The density of sugar is 1.59 g/mL. The mass of a sample is 4.0 g. Find the volume of the sample.

$D = \frac{m}{v}$ $\quad 1.59\ g/mL = \frac{4.0\ g}{V} \quad = 2.5\ mL$

$D = \frac{1.59\ g}{1\ mL}$

m = 4.0 g

V = ?

$V = \frac{m}{D}$ $\quad V = \frac{4.0\ \cancel{g}}{1.59\ \cancel{g}/mL} \quad V = 2.5\ mL$

Chemistry, Bell Work, Thursday, Mar 29 (3 questions)

1. **How does the density of the carbon dioxide (CO_2) gas compare to liquid and solid CO_2 ?**

	Density (g/mL)
Solid CO_2 (dry ice)	1.56
Liquid CO_2	1.10
CO_2 gas	0.0019

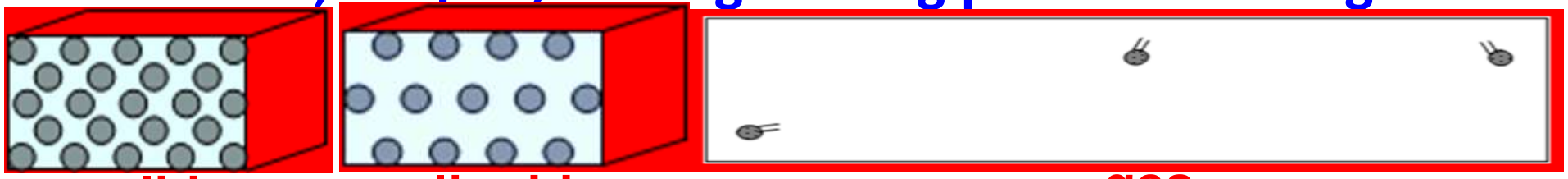
$$\frac{solid\ density}{liquid\ density} = \frac{1.56}{1.10} = 1.40$$

$$\frac{liquid\ density}{gas\ density} = \frac{1.10}{0.0019} = 579$$

$$\frac{solid\ density}{gas\ density} = \frac{1.56}{0.0019} = 821$$

- The solid CO_2 particles are 1.4 times more dense (close) than the liquid CO_2
- The CO_2 gas is 579 times more spread out than the liquid CO_2
- CO_2 gas is 821 times more spread out than solid CO_2

2. **Using what you know about density, draw and label a pictures of a solid, a liquid, and a gas using particle drawings in a box.**



solid liquid gas

3. **What is in between the particles?** Empty space.