## Density and Percent Error

## Density

- Density is an Intensive property.
- What does that mean again??
- An intensive property doesn't change when you take away some of the sample.
- Can be used as a method of identification

$$
\text { Density }=\frac{\text { Mass }}{\text { Volume }}
$$

- 1. What is the density of CO gas if 0.196 g occupies a volume of 100 ml ?
- 3. An irregularly shaped stone was lowered into a graduated cylinder holding a volume of water equal to 2 ml . The height of the water rose to 7 ml . If the mass of the stone was 25 g , what was its density?
- I threw a plastic ball in the pool for my dog to fetch. The mass of the ball was 125 grams. What must the volume be to have a density of $0.500 \mathrm{~g} / \mathrm{mL}$.


## Methods of finding density

- What information do we need to plug into the formula??
- You can Solve for D, or m, or v


## Percent Error

$$
\% \text { Error }=\frac{\mid \text { Accepted }- \text { Experimental } \mid}{\text { Accepted }} \times 100
$$

## The Components of the Formula

- Estimated Value (Measured Value)- The value that has been derived from an experiment, or an estimated value.
- Actual Value (What you should have gotten!)- This value is the exact value excepted throughout the scientific community, or the value which is determined exact, at a later point in time.
- The density for ammonia was measured to be 0.7134 $\mathrm{g} / \mathrm{mL}$ in a lab. The actual density is $0.6028 \mathrm{~g} / \mathrm{mL}$. What is the percent error?


## Practice Problems

- Johnny calculates from an experiment that he has 22.7 grams of carbon. However, he should have gotten 21.8 grams of carbon, which was the accepted value for this experiment. What was his percent error?
- What is the percent error in using 3.14 as an approximation for $\pi$ (which is 3.14159265358979323846...) ?


## More Practice

- The actual value for the absorption of carbon is . 135 . Steven calculated from his experiment that that absorption was .235. What is the percent error in Steven's experiment?
- I estimated that the repairs to my car would cost $\$ 80$. In fact they cost $\$ 120$.
What was the percentage error?
- Jim expected 24 people to turn up for a job interview, but only 18 did. What was the percentage error?


## Practice together and check

- Work with one other person
- Do not copy, work together
- Page 36


## Due tomorrow

- Study guide page
37-40
- Unit 1 test is tomorrow
- Measurements
- Lab equipment
- Lab Safety
- Graphing
- Metrics


## Additional practice

The boiling point of water is $100^{\circ} \mathrm{C}$. During an experiment, water came to a boil at $97^{\circ} \mathrm{C}$ according to the thermometer that was being used. What is the percent error of the thermometer?

answer 3.0\%

## Additional practice

3. An experiment performed to determine the density of lead yields a value of $10.95 \mathrm{~g} / \mathrm{cm}^{3}$. The accepted value for the density of lead is 11.342 $\mathrm{g} / \mathrm{cm}^{3}$. Find the percent error.
answer 3.46\%
