

# Lab Skills, Techniques, Concepts & Calculations

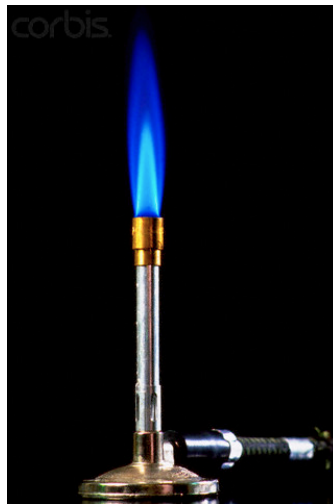
## Skills

## Lab Procedures & % Error

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### Lighting a Bunsen Burner

1. “Shutdown” the burner
2. Turn on the gas
3. Open the needle valve
4. Light the burner
5. Adjust the flame
  1. Valve = height
  2. Barrel = heat
6. Shut of burner at the tap



## Lab Procedures & % Error

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### Using a Balance

- Never put chemicals directly on the balance - use a weighing boat
- Use the **tare button** to **rezero** the balance or remove the mass of a container
- **Don't** estimate 1 digit past the scale of the device because it is a digital read-out and doesn't allow estimation

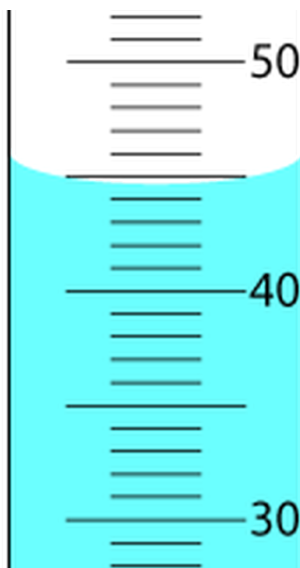


## Lab Procedures & % Error

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### Reading a Graduated Cylinder

- Meniscus - concave-up surface on a liquid in a cylinder
- Parallax - error in measurement caused by misalignment
- **Do** estimate 1 decimal place past the scale of the device



## Lab Procedures & % Error

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### Filtering

1. Fold in half
2. Repeat
3. Open pleats "1 and 3"
4. Clip the corner of the outer pleat
5. Put in funnel and wet
6. Don't pour over the filter paper

# Techniques

## Lab Procedures & % Error

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### Dispensing Liquids

#### Pouring

1. Remove the lid - palm it!
2. Dispense the liquid - never pour back into stock bottle
3. Return the lid to the bottle *without* setting it on the counter
4. Always use a graduated cylinder

#### Transferring

1. Use the attached pipet
2. Squeeze the pipet to bring up the liquid into the bulb
3. Dispense liquid back into stock bottle down to the desired amount
4. Squeeze the pipet again to transfer the liquid
5. Return the pipet to its assigned bottle

## Lab Procedures & % Error

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### Dispensing and Weighing Solids

- Always important to avoid contamination
- Never put chemical directly on the balance - use a weighing boat
- Use the “tap method” to dispense solid
- Never pour back into stock containers - use your spoon and dispose of extras

# Concepts and Calculations

### Lab Procedures & % Error

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#### Finding Mass by Difference

- When we learned to use a balance, we learned that our masses may be incorrect due to errors in the balance
- How can we overcome this issue and be certain that our masses are accurate?
- Find *Mass by Difference* (just like question 3 on the back of the homework we just graded today)

Mass of Beaker: \_\_\_\_\_

Mass of Beaker & Salt: \_\_\_\_\_

### Lab Procedures & % Error

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#### Significant Digits in Calculation

- Multiplication and division
  - You get as many significant digits in your answer as the least accurate number in the calculation
- Addition and subtraction
  - Conserve decimal places, not significant digits

$$\begin{array}{r} 125.50\text{g} \\ \times 2.3\text{g} \\ \hline 288.65\text{g} \\ 290\text{g} \end{array}$$

$$\begin{array}{r} 125.50\text{g} \\ - 2.3\text{g} \\ \hline 123.20\text{g} \\ 123.2\text{g} \end{array}$$

## Lab Procedures & % Error

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### Representing Error

- Percent Error Equation

$$\% \text{ Error} = \frac{|\text{measured} - \text{accepted}|}{\text{accepted}} \times 100$$

measured = the value you measure or calculated (also called experimental)

accepted = the correct value

## Lab Procedures & % Error

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### Percent Error - An Example

- A chemist reacts Na and Cl together in a closed pyrex container. He expects to produce 17.20 grams of product. If he only collect 13.85 grams, what is the percent error?

$$\% \text{ Error} = \frac{|\text{measured} - \text{accepted}|}{\text{accepted}} \times 100$$

$$\% \text{ Error} = \frac{|13.85\text{g} - 17.20\text{g}|}{17.20\text{g}} \times 100$$

$$\% \text{ Error} = \frac{|-3.35\text{g}|}{17.20\text{g}} \times 100$$

$$\% \text{ Error} = 19.5\%$$