**Bunsen Burner Lab!!!!**

**Background:** Often a chemist needs to heat materials. The Bunsen Burner is one of the most efficient ways of doing this. Burners come in a variety of designs but most operate on the principle of mixing gas with air to produce a hot flame. In this lab you will learn how to light and adjust a burner flame and to locate the hottest part of the flame.

**Materials:**
- Spark lighter
- Bunsen Burner
- Support stand w/ ring wire
- Screen
- Gloves
- 250 mL beaker
- 100mL graduated cylinder
- Metal thermometer

**Part 1: Parts of a Bunsen Burner!**

1. Sketch one of the Bunsen burners from the lab. (In the space Below)
2. Identify and label its parts using the guide sheet!
3. Give the purpose of each part of the Bunsen Burner!

---

**Diagram: Bunsen Burner**

- **A:** Barrel - Where gas & air are mixed
- **B:** Collar - Adjust air intake
- **C:** Air intake opening - Air enters here
- **D:** Gas flow valve - Regulates flow of gas
- **E:** Gas intake tube - Gas enters here
- **F:** Base - Supports Burner

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Part 2: Setting Up a Bunsen Burner! WAIT FOR HELP FROM A BEFORE STEP 4!!!!!!!!!

Procedure:
1. Connect the hose to the table outlet. Clear the area of all flammable objects (including clothing & your hair!)
2. Turn the barrel so that the air intake openings are closed, and then open them three full turns.
3. Close the gas flow valve at the bottom of the burner, and then open it three full turns.
4. Put on your goggles, **Call over a teacher to: open the gas valve on the table and light the burner.**
5. Adjust the barrel so that the flame is pale blue with a dark blue inner cone.

Part 3: What is the Hottest Part of the Flame?

Procedure:
1. Set up the support stand, ring, and wire screen as shown in the photos (see below).
2. Position the ring clamp so that the beaker is at the position assigned to your group.
3. Put 100mL of water into the beaker and record the starting temperature of the water on your data sheet.
4. Heat the water and record temperature every 1 min.
5. Continue this until the water Boils (100 degrees Celsius). Write down the amount of time it took to boil!
6. Write data on board and Obtain data from all groups, make sure you have data from all heights.

Parts of the Flame!

![Diagram of parts of the flame](image)

Position A
Position B
Position C
Position D

Parts of the Flame:
A. Base of flame
B. Tip of inside blue cone
C. Top of the flame
D. 2 cm above the flame

Chemical Reaction occurring in the flame: \[ C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O \]
Data Table:

Fill in your data as well as the class data below. For Flame Position look at the diagram above and determine what part of the flame the bottom of the beaker is in. Fill in A, B, C or D in "Flame Position"

<table>
<thead>
<tr>
<th>Height</th>
<th>Flame Position</th>
<th>Starting Temp</th>
<th>1 min</th>
<th>2 min</th>
<th>3 min</th>
<th>4 min</th>
<th>5 min</th>
<th>6 min</th>
<th>7 min</th>
<th>8 min</th>
<th>9 min</th>
<th>10 min</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 cm</td>
<td>A</td>
<td>20</td>
<td>28</td>
<td>40.5</td>
<td>53</td>
<td>65</td>
<td>76.5</td>
<td>84.9</td>
<td>91.0</td>
<td>92.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 cm</td>
<td>B</td>
<td>20</td>
<td>32</td>
<td>57</td>
<td>76</td>
<td>95</td>
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<tr>
<td>12 cm</td>
<td>D</td>
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<td>31</td>
<td>38</td>
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<td>51</td>
<td>56</td>
<td>61</td>
<td>66</td>
<td>11 min</td>
<td>13 min</td>
</tr>
</tbody>
</table>

How long did it take your water to boil: 100.5 min

What was the final Temperature: 71°C after 12 mins

Analysis/Conclusions

1. Draw a Graph!
   a. Using the data you collected create a graph of Temperature vs Time!
   b. Make sure to include
      i. Title
      ii. Labeled Axis
      iii. All four positions (A-D) graphed on the same graph paper
      iv. All four best-fit lines for positions A-D are labeled or there is a Key.

2. From the data that you have graphed determine what the hottest part of the flame is. Explain how you made this conclusion. Use your graph and data table to explain.

   B because the water that was under the B part of the flame got to 100 the fastest out of the other waters that were under different parts of the flame.

   It had the steepest slope.
3. What parts of the Bunsen burner allow air to be mixed in with the gas? Why do the gas and air need to be mixed (hint look at the reaction at the bottom of page 2)

air & gas mix in the barrel, they need to be mixed to make a product that will be able to catch on fire (3CO₂ + 4H₂O)

air & gas actually end up what catch fire & CO₂ & H₂O are produced after

4. What sources of Error may have occurred during this lab? Find two examples and explain how your results may have been affected.

- Flames might have been different heights / temperatures due to how the barrel was positioned. It would have taken longer / shorter time for the water to boil then the other groups. It had different flame heights / temps and the results wouldn’t have been accurate because all flames were not all the same.

- The time might have been off - might have been longer / shorter than a minute when temp. was taken. It would have made it so the time / temp measurements were not accurate and the time it took for the water to boil was actually longer / shorter. And the graph would not be as linear.
Bunsen Burner Lab!!!!

Background: Often a chemist needs to heat materials. The Bunsen Burner is one of the most efficient ways of doing this. Burners come in a variety of designs but most operate on the principle of mixing gas with air to produce a hot flame. In this lab you will learn how to light and adjust a burner flame and to locate the hottest part of the flame.

Materials:
Spark lighter
Bunsen Burner
support stand w/ ring wire
screen
gloves
250 mL beaker
100mL graduated cylinder
metal thermometer

Part 1: Parts of a Bunsen Burner:
1. Sketch one of the Bunsen burners from the lab. (In the space Below)
2. Identify and label its parts using the guide sheet!
3. Give the purpose of each part of the Bunsen Burner!
Part 2: Setting Up a Bunsen Burner! WAIT FOR HELP FROM A BEFORE STEP 4!!!!!!!!!

Procedure:
1. Connect the hose to the table outlet. Clear the area of all flammable objects (including clothing & your hair!)
2. Turn the barrel so that the air intake openings are closed, and then open them three full turns.
3. Close the gas flow valve at the bottom of the burner, and then open it three full turns.
4. Put on your goggles. **Call over a teacher to: open the gas valve on the table and light the burner.**
5. Adjust the barrel so that the flame is pale blue with a dark blue inner cone.

Part 3: What is the Hottest Part of the Flame?

Procedure:
1. Set up the support stand, ring, and wire screen as shown in the photos (see below).
2. Position the ring clamp so that the beaker is at the position assigned to your group.
3. Put 100mL of water into the beaker and record the starting temperature of the water on your data sheet.
4. Heat the water and record temperature every 1 min.
5. Continue this until the water Boils (100 degrees Celsius). Write down the amount of time it took to boil!
6. Write data on board and Obtain data from all groups, make sure you have data from all heights.

Parts of the Flame!

![Diagram showing Parts of the Flame](image)

Chemical Reaction occurring in the flame: \( \text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 3\text{CO}_2 + 4\text{H}_2\text{O} \)
Data Table:

Fill in your data as well as the class data below. For Flame Position look at the diagram above and determine what part of the flame the bottom of the beaker is in. Fill in A, B, C or D in “Flame Position”

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<th>6 min</th>
<th>7 min</th>
<th>8 min</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 cm</td>
<td>A</td>
<td>20.1</td>
<td>24</td>
<td>40.5</td>
<td>53</td>
<td>65</td>
<td>74.5</td>
<td>84.9</td>
<td>91</td>
<td>92.5</td>
</tr>
<tr>
<td>4 cm</td>
<td>B</td>
<td>20</td>
<td>33</td>
<td>57</td>
<td>70</td>
<td>80</td>
<td>95</td>
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<tr>
<td>6 cm</td>
<td>B</td>
<td>22</td>
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<td>8 cm</td>
<td>C</td>
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<td>25</td>
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<tr>
<td>10 cm</td>
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<td>45</td>
<td>51</td>
<td>56</td>
<td>61</td>
<td></td>
</tr>
</tbody>
</table>

How long did it take your water to boil: 8 min  
What was the final Temperature: 92.5°C

Analysis/Conclusions

1. Draw a Graph!
   a. Using the data you collected create a graph of Temperature vs Time!
   b. Make sure to include
      i. Title
      ii. Labeled Axis
      iii. All four positions (A-D) graphed on the same graph paper
      iv. All four best-fit lines for positions A-D are labeled or there is a Key.

2. From the data that you have graphed determine what the hottest part of the flame is. Explain how you made this conclusion. Use your graph and data table to explain.

   The hottest part of the flame is B because based on the graph, it heats up faster.
3. What parts of the Bunsen burner allow air to be mixed in with the gas? Why do the gas and air need to be mixed (hint look at the reaction at the bottom of page 2)

Gas and air is mixed, the gas will have less difficulty in finding oxygen molecules.

Why do we need both?

4. What sources of Error may have occurred during this lab? Find two examples and explain how your results may have been affected.

- The weather could affect the rubberometer’s pressure, which doesn’t give accurate results.
- The position of the flame could affect the results and the boiling point would be different.
Bunsen Burner Lab!!!

Background: Often a chemist needs to heat materials. The Bunsen Burner is one of the most efficient ways of doing this. Burners come in a variety of designs but most operate on the principle of mixing gas with air to produce a hot flame. In this lab you will learn how to light and adjust a burner flame and to locate the hottest part of the flame.

Materials:
Spark lighter  
Bunsen Burner  
support stand w/ ring wire  
screen  
gloves  
100mL graduated cylinder  
250 mL beaker  
gas flow valve  
metal thermometer

Part 1: Parts of a Bunsen Burner!
1. Sketch one of the Bunsen burners from the lab. (In the space Below)
2. Identify and label its parts using the guide sheet!
3. Give the purpose of each part of the Bunsen Burner!
Part 2: Lighting a Bunsen Burner! WAIT FOR HELP FROM A TEACHER!!!!!!

Procedure:
1. Connect the hose to the table outlet. Clear the area of all flammable objects (including clothing & your hair!)
2. Turn the barrel so that the air intake openings are closed, and then open them three full turns.
3. Close the gas flow valve at the bottom of the burner, and then open it three full turns.
4. Put on your goggles, open the gas valve on the table and light the burner.
5. Adjust the barrel so that the flame is pale blue with a dark blue inner cone.

Part 3: What is the Hottest Part of the Flame?

Procedure:
1. Set up the support stand, ring, and wire screen as shown in the photos (see below).
2. Position the ring clamp so that the beaker is at the position assigned to your group.
3. Put 100mL of water into the beaker and record the starting temperature of the water on your data sheet.
4. Heat the water for 2 minutes recording the temperature every 15 seconds.
5. Obtain data from all groups, make sure you have data from Positions A, B, C and D. Record all data.

Parts of the Flame!

Position A  
(base of flame)  
Position B  
(tip of inner blue flame)  
Position C  
(top of flame)  
Position D  
(2 cm above flame)

Parts of the Flame
A. Base of flame  
B. Tip of inside blue cone  
C. Top of the flame  
D. 2 cm above the flame

Chemical Reaction occurring in the flame:  \[ \text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 3\text{CO}_2 + 4\text{H}_2\text{O} \]
3. What parts of the Bunsen burner allow air to be mixed in with the gas? Why do the gas and air need to be mixed (hint look at the reaction at the bottom of page 2)

The air intake openings allow the gas to be mixed with the outside air. This is important because oxygen is needed for many reactions to occur and the air contains oxygen in the air along with other gases allow reactions to occur.

4. What sources of Error may have occurred during this lab? Find two examples and explain how your results may have been affected.

1. The temperature could have been taken at not exactly a minute which would change the data to be hotter/colder than it actually was.

2. The flame could have got bigger or smaller so instead of getting the position of the flame designated, the data could be from a hotter or colder part of the flame.
### Data Table:

<table>
<thead>
<tr>
<th>Position</th>
<th>Starting Temp</th>
<th>30 Sec</th>
<th>45 Sec</th>
<th>60 Sec</th>
<th>75 Sec</th>
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<th>105 Sec</th>
<th>120 Sec</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>25°</td>
<td>35°</td>
<td>56°</td>
<td>80°</td>
<td>91°</td>
<td>101°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>24°</td>
<td>38°</td>
<td>56°</td>
<td>73°</td>
<td>89°</td>
<td>Boiling</td>
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</tr>
<tr>
<td>C</td>
<td>21°</td>
<td>20.7°</td>
<td>40.1°</td>
<td>54.3°</td>
<td>70.8°</td>
<td>83.7°</td>
<td>94.3°</td>
<td>101°</td>
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<tr>
<td>D</td>
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</tbody>
</table>

### Analysis/Conclusions

1. **Draw a Graph!**
   
   a. Using the data you collected create a graph of Temperature vs Time!

   b. Make sure to include
      
      i. **Title**

      ii. **Labeled Axis**

      iii. **All four positions** (A-D) graphed on the same graph paper

      iv. **All four best-fit lines** for positions A-D are labeled or there is a **Key**.

2. From the data that you have graphed determine what the hottest part of the flame is. Explain how you made this conclusion. Use your graph and data table to explain.

   I think that **Point A**, which is the base of the flame, is the hottest part. This is because the water boiled the quickest at this point. The point A line also has the greatest slope of all the lines on the graph.
\[ y = 25 + 10x \]

Line of best fit

Bunsen Burner Lab
**Bunsen Burner Lab: Make Up Homework!**

**Background:** Often a chemist needs to heat materials. The Bunsen Burner is one of the most efficient ways of doing this. Burners come in a variety of designs but most operate on the principle of mixing gas with air to produce a hot flame. In this lab you will learn how to light and adjust a burner flame and to locate the hottest part of the flame.

**Part 1: Parts of a Bunsen Burner!**

1. Sketch one of the Bunsen burners from the lab. (In the space Below)
2. Identify and label its parts using the guide sheet!
3. Give the purpose of each part of the Bunsen Burner in your own words!
Part 3: What is the Hottest Part of the Flame?

Here are the steps taken by your peers to determine the hottest part of the flame. Each student studied a different distance between The Bunsen burner and the bottom of the beaker. Use their data to answer the conclusion questions.

Procedure:
1. Set up the support stand, ring, and wire screen as shown in the photos (see below).
2. Position the ring clamp so that the beaker is at the position assigned to your group.
3. Put 100mL of water into the beaker and record the starting temperature of the water on your data sheet.
4. Heat the water and record temperature every 1 min.
5. Continue this until the water Boils (100 degrees Celsius). Write down the amount of time it took to boil!
6. Write data on board and Obtain data from all groups, make sure you have data from all heights.

Parts of the Flame!

![Diagram showing positions A, B, C, D with distances 2 cm, 4 cm, 6 cm, 8 cm... etc!]

Position D
Position C
Position B
Position A

Parts of the Flame
A. Base of flame
B. Tip of inside blue cone
C. Top of the flame
D. 2 cm above the flame

Chemical Reaction occurring in the flame: \( \text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 3\text{CO}_2 + 4\text{H}_2\text{O} \)
Heat of flame over time

Temperature (°C)

TIME (in minutes)

A
B
C
D
3. What parts of the Bunsen burner allow air to be mixed in with the gas? Why do the gas and air need to be mixed (hint look at the reaction at the bottom of page 2)

The barrel, air intake opening, collar, and gas intake tube.

4. What sources of Error may have occurred during this lab? Find two examples and explain how your results may have been affected.

One error could be misreading the thermometer when gathering data. As a result, my line of best fit could be completely different. Another error could have been not adjusting my beaker to the right height. This would totally screw up my experiment and perhaps say it was way too close, I'd establish that the wrong part was hotter.
Data Table:

For Flame Position look at the diagram above and determine what part of the flame the bottom of the beaker is in. Fill in A, B, C or D in "Flame Position"

<table>
<thead>
<tr>
<th>Height</th>
<th>Flame Position</th>
<th>Starting Temp</th>
<th>1 min</th>
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<tbody>
<tr>
<td>2 cm</td>
<td>A</td>
<td>25</td>
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<td>56</td>
<td>80</td>
<td>91</td>
<td>101</td>
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<td>4 cm</td>
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<td>26.7</td>
<td>40.1</td>
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<td>101</td>
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<tr>
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<td>22.5</td>
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</tr>
</tbody>
</table>

Analysis/Conclusions

1. Draw a Graph!
   a. Using the data you collected create a graph of Temperature vs Time!
   b. Make sure to include
      i. Title
      ii. Labeled Axis (X-time Y-Temp)
      iii. All four positions (A-D) graphed on the same graph paper
      iv. All four best-fit lines for positions A-D are labeled or there is a Key.

2. From the data that you have graphed determine what the hottest part of the flame is. Explain how you made this conclusion. Use your graph and data table to explain.

   Part A is the hottest part of the flame. I determined this by seeing that it only took 5 minutes to boil the water (the chart tells me this). In addition, by looking at the graph, I can see that the slope of the line is steeper than the others, which tells me that the temperature increased quicker.
Bunsen Burner Lab: Make Up Homework!

**Background:** Often a chemist needs to heat materials. The Bunsen Burner is one of the most efficient ways of doing this. Burners come in a variety of designs but most operate on the principle of mixing gas with air to produce a hot flame. In this lab you will learn how to light and adjust a burner flame and to locate the hottest part of the flame.

**Part 1: Parts of a Bunsen Burner!**

1. Sketch one of the Bunsen burners from the lab. (In the space Below)
2. Identify and label its parts using the guide sheet!
3. Give the purpose of each part of the Bunsen Burner in your own words!

---

- **Barrel** (place for flame to travel up)
- **Air port** (air to be let out/in)
- **Gas inlet** (where the gas goes in)
- **Needle valve**
- **Base** (to keep the flame steady)
Part 3: What is the Hottest Part of the Flame?

Here are the steps taken by your peers to determine the hottest part of the flame. Each student studied a different distance between The Bunsen burner and the bottom of the beaker. Use their data to answer the conclusion questions.

Procedure:
1. Set up the support stand, ring, and wire screen as shown in the photos (see below).
2. Position the ring clamp so that the beaker is at the position assigned to your group.
3. Put 100mL of water into the beaker and record the starting temperature of the water on your data sheet.
4. Heat the water and record temperature every 1 min.
5. Continue this until the water Boils (100 degrees Celsius). Write down the amount of time it took to boil!
6. Write data on board and Obtain data from all groups, make sure you have data from all heights.

Parts of the Flame!

![Images showing different positions of the Bunsen burner]

Position A, Position B, Position C, Position D

Parts of the Flame
A. Base of flame
B. Tip of inside blue cone
C. Top of the flame
D. 2 cm above the flame

Chemical Reaction occurring in the flame: \( \text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 3\text{CO}_2 + 4\text{H}_2\text{O} \)
Data Table:

For Flame Position look at the diagram above and determine what part of the flame the bottom of the beaker is in. Fill in A,B,C or D in “Flame Position”

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<th>5 min</th>
<th>6 min</th>
<th>7 min</th>
<th>8 min</th>
<th>9 min</th>
<th>10 min</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 cm</td>
<td>A</td>
<td>25</td>
<td>35</td>
<td>56</td>
<td>80</td>
<td>91</td>
<td>101</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 cm</td>
<td>B</td>
<td>24</td>
<td>38</td>
<td>56</td>
<td>73</td>
<td>89</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 cm</td>
<td>C</td>
<td>21</td>
<td>26.7</td>
<td>40.1</td>
<td>54.3</td>
<td>70.8</td>
<td>83.7</td>
<td>94.3</td>
<td>101</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 cm</td>
<td>D</td>
<td>22.5</td>
<td>29.5</td>
<td>40</td>
<td>51</td>
<td>61.5</td>
<td>70</td>
<td>79.8</td>
<td>89.1</td>
<td>94.9</td>
<td>96</td>
<td>99</td>
</tr>
</tbody>
</table>

Analysis/Conclusions

1. Draw a Graph!
   a. Using the data you collected create a graph of Temperature vs Time!
   b. Make sure to include
      i. Title
      ii. Labeled Axis (X-time Y-Temp)
      iii. All four positions (A-D) graphed on the same graph paper
      iv. All four best-fit lines for positions A-D are labeled or there is a Key.

2. From the data that you have graphed determine what the hottest part of the flame is. Explain how you made this conclusion. Use your graph and data table to explain.

The hottest part of the flame is part A, it becomes the hottest the fastest of all. It's line is much steeper than the others. It takes only 5 minutes to reach 100°, and so does B, but A's temperature is one degree higher.
3. What parts of the Bunsen burner allow air to be mixed in with the gas? Why do the gas and air need to be mixed (hint look at the reaction at the bottom of page 2)

The air ports allow air to mix with the gas. They need to be mixed so that the fire (\(3CO_2 + 4H_2O\)) to be made.

\[
\begin{align*}
& \text{CO}_2 + \text{H}_2\text{O} \\
& \text{isn't fire itself but byproducts}
\end{align*}
\]

4. What sources of Error may have occurred during this lab? Find two examples and explain how your results may have been affected.

(1) Your measurements could be wrong (if you read it wrong, do it wrong, etc..)

(2) Air could be blowing and hype up your flame