

## EFFECTS of CAFFEINE and ALCOHOL on Respiration Hypothesis Testing and Data Analysis



**Problem:** What are the effects of the drugs alcohol and caffeine on the respiration rate of Fathead Minnow?

You have probably observed that when people drink too much coffee they are often hyperactive. They may be jittery, nervous, and complain about being unable to relax. On the other hand, when people drink too much alcohol their speech often slurs, they may lose control of their muscular coordination, and their reaction time slows down. Too much alcohol may even cause them to pass out. Since it is neither wise nor ethical for untrained scientists to experiment on humans, you will instead use a MODEL, in this case a *Fathead Minnow*, to test your hypotheses.

---

**Using your best educated guess (hypothesis), what are your predictions for caffeine and alcohol's effects on the minnows?**

**Hypothesis #1**

**Hypothesis #2**

### **Procedure:**

1. Capture a living minnow from the stock jar and place it in a small jar.
2. To get the baseline respiration rate, count the number of gill cover movements for 15 seconds. The rate in a healthy minnow will be very rapid. Multiplying the beats counted in 15 seconds by 4 will give you the number of respirations per minute. Record your data on the table provided.
3. To test the effect of alcohol, place one pipette of 2% alcohol in the jar. Wait one minute and then count the respirations. Record your results on the provided table.
4. Using the same procedure, test the effects of 4% and 6% alcohol solutions. Record your results on the table provided.
5. After your series are done, return the minnow to the recovery tank.
6. Repeat the same procedure on a different minnow, but use the caffeine solutions this time. Start with the lowest concentration and work your way up to the highest. Record your data on the table provided. Return your minnow to the recovery tank after completed.

**Your goal is to get three alcohol series and three caffeine series done and recorded on the table in the allotted time. Answer the conclusion portion, and fully explain your ideas and answers to the questions on a separate piece of paper.**

<b>% Drug</b>	<b>#1</b>	<b>#2</b>	<b>#3</b>	<b>#4</b>	<b>Average</b>
plain water					
2% Alcohol					
4% Alcohol					
6% Alcohol					
0.5% Caffeine					
1.0% Caffeine					
Caffeine					

**Conclusions**

This is the place to say whether or not your hypotheses were accepted or rejected. Remember, in science things cannot be proved, we are never really sure, just more or less confident of our conclusions.

**\*\*\*On a separate piece of paper\*\*\***

**#1. Can you use your results to predict if there might be any effects of chemicals in local lakes and rivers? What might you see? What might happen? How could you test these predictions?**

**#2. What were some complications or issues you had during the experiment that might have affected your data and how could those be corrected or eliminated if this lab was repeated?**