

## Practice makes perfect – Student Designed Labs

**Instructional Objectives:** Demonstrate your knowledge of appropriate laboratory safety practice and the scientific method process. Design and follow a multi-step procedure for use of various scientific materials.

**Background Information:** ScienceZyme Inc., a large pharmaceutical company, recently developed a new, colorful pill for treating stomachaches. The dangers and hazards associated with the chemicals in this pill are still very unknown. The medicine should therefore be handled with care at all times. Remember - as tasty as these colorful pills may look, do not eat or drink anything in a scientific laboratory.

**Experimental Question:** The biologists at ScienceZyme are interested in the rate at which these new pills will dissolve in the human body and have therefore assigned your laboratory team to answer the following question..... **What temperature of the “mystery acid” will be the fastest at removing the “S” on this new pharmaceutical pill?**

**Hypothesis:** *If I do this, then this will happen.*

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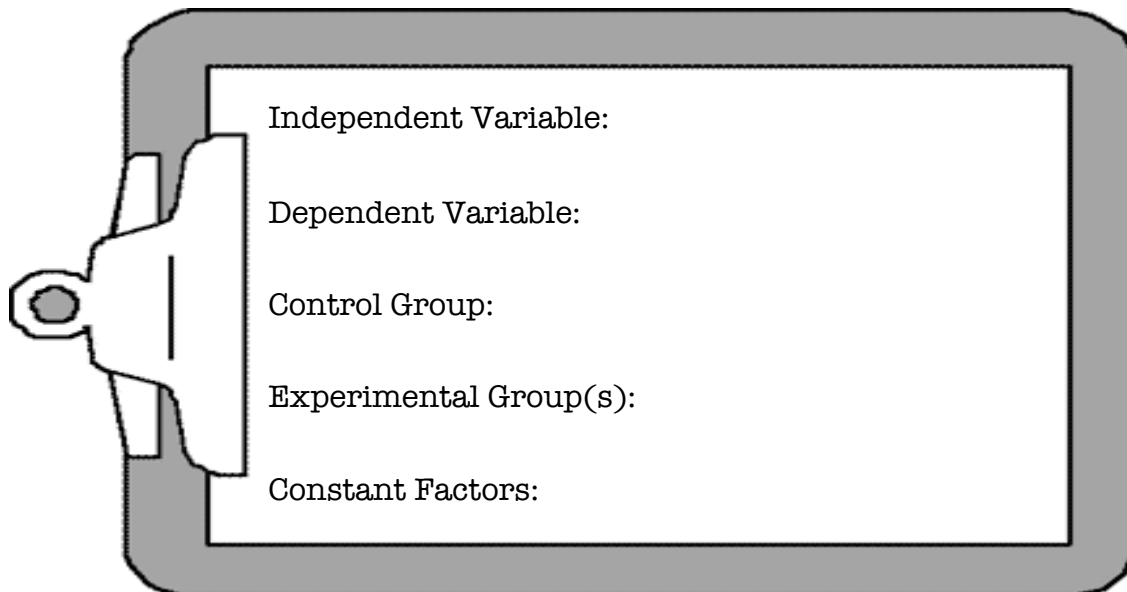
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### Available Materials and Safety Information:

- Hot, room temperature, and cold “mystery acid” chemical (*treat as dangerous*)
- 3 beakers (*made of glass and should be handled with care; safety goggles should be worn*)
- Thermometers
- 3 pills of the same color (*this is an unknown substance and should be handled with care*)
- Stopwatch (on phone, if needed)
- Forceps
- Gloves, Goggles, and Safety Aprons

**Before you design your procedure, identify the variables you will be addressing through your experiment.**



Independent Variable:

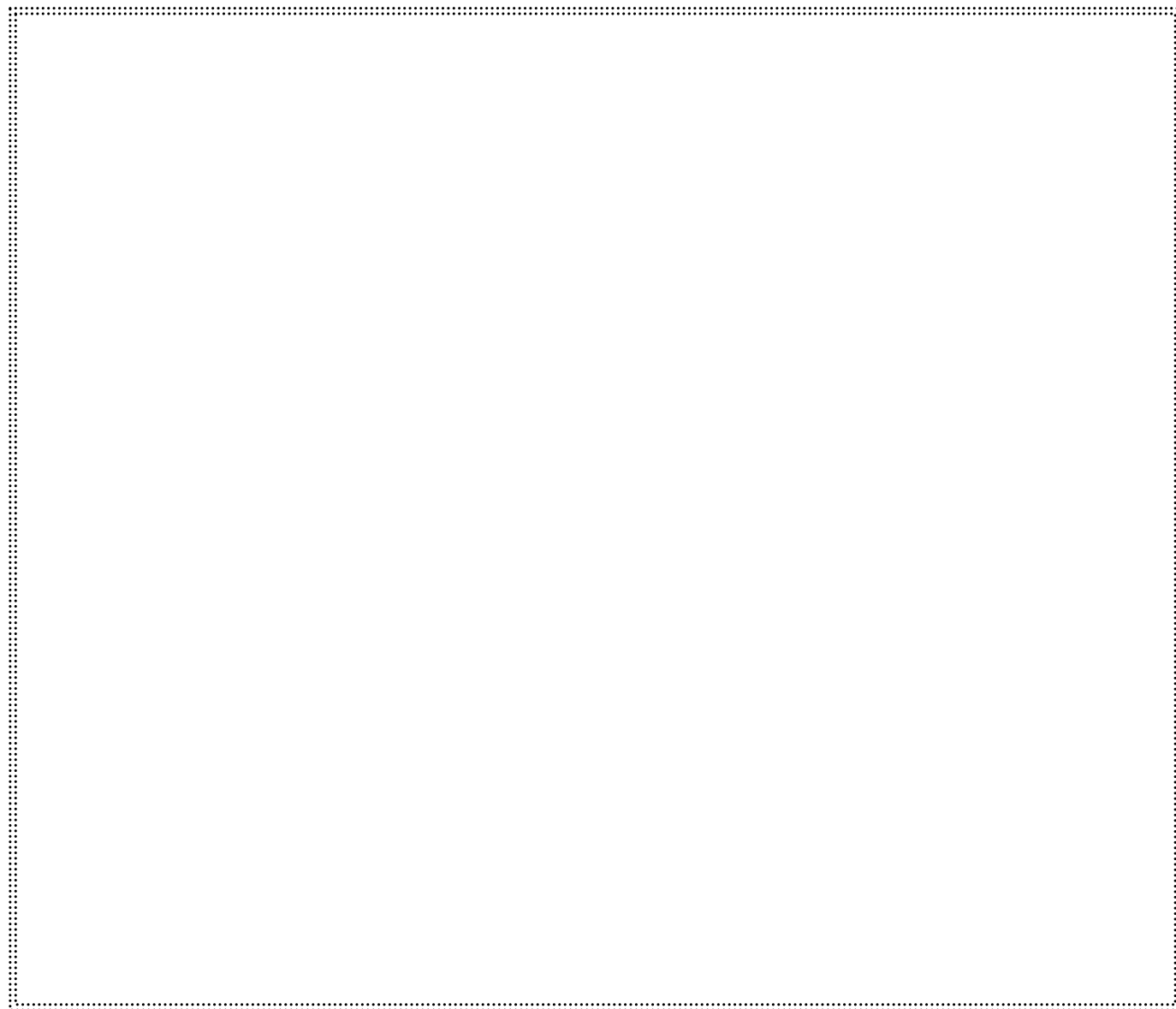
Dependent Variable:

Control Group:

Experimental Group(s):

Constant Factors:

**Test your Hypothesis:** Use the space below (or a separate sheet of paper) to design a procedure that *addresses the experimental question and tests your hypothesis*. Remember the importance of a detailed procedure (give exact measurements when possible). Be sure to include safety information and chemical discard/ clean up instructions.



**Experimental Data:** Collect data and create your own data table (chart) that clearly illustrates the results of your experiment. *Your chart should include both quantitative and qualitative data.*

**Data Analysis and Conclusion:** Analyze your data and draw a conclusion. A good quality conclusion should summarize the results of your experiment, address the hypothesis (supported or rejected?), and answer the experimental question. You may also want to include any possible sources of error and/or suggestions for future investigations.



**Analysis and Evaluation:** All answers should be in complete sentences. A complete sentence should begin by restating the main idea of the analysis question.

1. **Based on your investigation, would ScienceZyme Inc.'s new medicine dissolve well in the human stomach? Explain your reasoning.**

Based on our investigation

2. **What were some of the safety measures you and your labmates demonstrated during your experiment?**

Some of the safety measures demonstrated

3. Summarize the importance of handling unknown substances with care.

It is important to handle unknown substances with care because

4. The pharmaceutical pills were only Skittles candy and the “mystery acid” was simply water! Knowing this, would it have been ok for you and your partner to eat any leftover skittles or drink the water from the beakers?

5. Describe the purpose of the scientific method.

6. Why is it important for scientists around the world to utilize a similar process for scientific investigation?

7. Communicate your results to another lab group in the classroom. Did you come up with similar results and conclusions? Provide an explanation for any discrepancies between your data.