Alpha Charter High School

Chemistry Lab Activities

All labs at Alpha Charter School are delivered by a California credentialed “high qualified” instructor. This instructor will be responsible for all activities leading up to, including and following each lab activity as the students study the topic in their online course. The student’s cumulative lab grade is included in their final class grade.

Lab Reports

All students are required to write comprehensive lab reports on all lab activities. These lab reports include the following information:

Purpose:

What question(s) are being answered here? Student will include other pertinent information from observation or instruction in this section. A student’s hypothesis would also be included in this section.

Materials: All materials necessary for the lab to be completed will be included in this section.

Procedure:

Students will include a step-by-step procedure, written in their own words. This description must be able to be followed by another student.

Data:

This section includes all observations, data tables, etc. necessary to provide evidence of the success of the experiment.

Calculations:

Where appropriate a sample of all calculations performed will be summarized in this section.

Conclusion:

The proposed hypotheses is accepted or rejected based on the data from the experiment. A summary of the results (averages, mean, median, mode where applicable), observations are written in this section. This section also includes the possibility of error, and an analysis of how that might affect their results.

Students will also include anything new that was learned during this experiment. If further research is required, students will include their new knowledge as well as the resources used to expand their lab experience.

Finally, students will apply their new learning in the lab experience to their real life, addressing the question “why do I need to know this?”

Lab 1: Wondering Why (in)

This qualitative analysis lab is designed to familiarize students with proper lab etiquette, lab equipment, scientific inquiry and data analysis. Using household “chemicals” students will dissolve various solids in a variety of liquids and examine each mixture for evidence of reaction.

Lab 2: **Physical and Chemical Change Lab**

Students will determine the differences between chemical and physical changes, by performing a series of reactions. Through the examination of the products, students will be able to explain the difference between a chemical and a physical change.

Lab 3: Density

Students will explore the concept of density using a variety of techniques. Density measurements will be conducted for solids (both regular and irregular shapes), liquids and gases.

Lab 4: Accuracy and Precision Lab

Students will apply the practice of measurement procedures and calculations. Density, precision, accuracy and percent error calculations will be performed once each lab step is completed. Students will be able to demonstrate good lab practice and excellent data reporting and analysis.

Lab 5: Models of Atoms

Students will construct models of covalent molecules and predict the geometry of each molecule. Students will also draw electron dot structures, assign partial charges and predict the polarity of each molecule.

Lab 6: Mendeleev for a Day

Students will combine Unknown Solutions with Test Solutions and evaluate the results of the combinations (double replacement reactions). From student results, the students will be able to demonstrate their critical thinking by grouping their results into specified patterns, much as Mendeleev did.

Lab 7: Flame Tests

Students will identify the cation of a solution by performing a flame test. Using the results of known solutions, students will then identify unknown solutions and identify some uses in “real life”

Lab 8: Metal Reactivities

Students will compare the metal reactivities of several metallic elements and attempt to rank their reactivities. All reactions are single replacement and students will also identify and demonstration their ability to predict the products of single replacement reactions

Lab 9: Beaker's Notes

Beaker's Notes is a scenario-based activity designed to assist students in identifying the patterns in naming compounds. Through a series of examples and "clues", students will discover the protocols used to name using both the classic and newer forms of naming both ionic and covalent compounds.

Lab 10: Percent Composition

The percent composition by mass of a compound represents the percent that each element in a compound contributes to the total mass of the compound. This premise can be used to determine the identity of an unknown substance. In this lab students will determine the percent composition of sugar in gum. They will be required to describe their experimental process, and then perform that experiment, and all the calculations that accompany the experiment.

Lab 11: Types of Chemical Reactions

Students, through the experimental process, will observe different types of chemical reactions. Based on their observations, students will identify reactions as single or double replacement, substitution, decomposition, synthesis or combustion. Students will also write balanced chemical reactions for each.

Lab 12: Limiting Reactant/Percent Yield

Students will learn to determine the limiting agent of a reaction through a standard single replacement reaction. Students will calculate theoretical, actual, and percent yield of the reaction in this lab activity.

Semester 2

Lab 14: Alka-Seltzer and the Ideal Gas Law

Students will collect the gas given off from the reaction of Alka-Seltzer and water. Using the mass difference, student will determine the mass lost by the process, and thus the mass of CO_2 produced. Students will use the ideal gas law to calculate the number of moles of gas produced, and from this, the molar mass of CO_2.

Lab 15: Concentration Lab

Using Kool-Aid as a basis for this lab, students will calculate the molarity of differing Kool-Aid solutions and then using volumetric flasks, actually create five solutions of differing molarities.

Lab 16: Classifying Solution Mixtures

Through a series of activities, students will explore the properties of heterogeneous and homogeneous solutions. Students will also identify colloids and suspensions.

Lab 17: Composition of Hydrates

Students will determine the percentage of water in a hydrate. Students will be given multiple samples of differing hydrates and be required to determine the percentage of water in each substance. Each substance will undergo three trials, as this lab is done in microscale. Students will compare their calculated values to the actual value and calculate their percent error.

Lab 18: All Things Being Equal

Students will explore equilibrium and understand what happens to the concentrations of reactants and products in an equilibrium system. Students will Initially do a wet lab and then perform a simulation for clearer understanding.

Lab 19: Specific Heat Capacity

Students will calculate q (the specific heat capacity) of a known metal. Students will then be given an "unknown" metal, and using the same procedure, identify the unknown.

Lab 20: Titration of Hydrochloric Acid with Sodium Hydroxide

Students will determine the concentration of a Hydrochloric Acid solution by titrating with a standardized sodium hydroxide solution. Students will perform appropriate acid/base calculations to determine the molarity of the HCl.

Lab 21: Electrochemistry and Galvanic Cells

Students will explore the half reactions necessary in creating galvanic cells. With this understanding, students will create a series of galvanic cells using different solutions and metals and measure cell conductivity.

Lab 22: Slime Lab

Students will examine the cross-linking that occurs in a polymer called "Slime". Students will devise and test the effects of varying concentrations of borax solution or polyvinyl alcohol to create the "best" slime.

Lab 23: Making Scents of Esters

Students will undergo a study of esterification by combining a series of carboxylic acids with an alcohol to produce an ester in water. Students will evaluate each ester by examining the chemical reaction that occurs and by their sense of smell.

Lab 24: Half-Life

In this lab activity, students will simulate the radioactive decay of an isotope over time and graph the data. Students will also model the transformation of radioactive materials, evaluate the limitations and strengths of the model and explain the sources of error in this simulation.