Topic: Redesigning a Lab Activity. Overview: In this final assignment for the course, you will demonstrate your understanding of the scientific method and how to design (or redesign) a basic chemistry experiment. During this course, you have conducted four hands-on lab activities (weeks 1-4). For this assignment, you will pick one of these lab activities, redesign the lab as outlined below, conduct the redesigned experiment, and then write a formal lab report. In the formal lab report, you will demonstrate your understanding of the organization of scientific research papers. Instructions: Select one of the four hands-on activities conducted during this course. Redesign the experiment. For example, perhaps you want to change a variable (i.e., temperature, concentration, etc.) that was not originally studied, or conduct the experiment in a different fashion. Perhaps you want to take an activity that focuses on kinetics and modify it so that its purpose is to study thermodynamics. You have a great bit of freedom with this project. Please keep in mind that a well-designed experiment needs to have an independent variable and a dependent variable. The independent variable is what the scientist manipulates in the experiment, while the dependent variable changes based on how the independent variable is manipulated. Therefore, the dependent variable provides the data for the experiment. As you redesign an experiment, please keep these three questions in mind: What materials are readily available for conducting this experiment? What variable(s) can I alter to better study this topic? What ways can I measure or describe the response to this change? What additional safety risks or considerations, if any, must be taken into account with this redesign? Once you have redesigned your experiment as outlined above, you are now ready to conduct the experiment. As you carry out this experiment, keep in mind that: Chemists must keep track of the information by recording the data. The data should be presented visually, if possible, such as through a graph or table. A control must be used. That way, results can be compared. Errors must be reported. After you have conducted your redesigned experiment and collected your data, you are now ready to write your formal lab report. The formal lab report should be self-contained so anyone, including someone without a science background or lab manual, can read it with an understanding of the purpose, procedures, and conclusions drawn from the experiment. Lab reports are expected to be organized, professional, and be free of grammar, syntax, and spelling errors. Avoid writing in the first person as much as possible. Lab reports should generally contain and clearly distinguish the sections discussed in detail below. The presentation and organization skills developed by writing lab reports is beneficial to all potential career fields. Your formal lab report should include the following: Title Page: This is the first page of the lab report and consists of the experiment title, your name, the date, and the course number and section number. Abstract: The abstract is written last even though it appears at the beginning of the lab report. An abstract is a concise paragraph including the experiment objectives, methods, results, and conclusions. Introduction and Background: State the purpose of the experiment. Include all hypotheses that were tested, and briefly outline background information relevant to the experiment. Materials and Methods: Describe the equipment that was used and the steps that were taken to perform the experiment in chronological order. Include the field and laboratory techniques that were used to collect and analyze the data. Insert photos and graphic illustrations that are applicable to how the experiment was performed. Results: Record all collected experimental data including observations, measurements, and visual representations of data. Show all work for any calculations or equations. Title every graph and clearly label the axes. Include all data tables, graphs, and photos in an organized fashion. The data recorded in tables and graphs should include the appropriate units, as well as one to two sentences describing each data table and figure. Note any anomalies, errors, or difficulties encountered in collecting data as these may affect the final results. Discussion and Conclusion: Organize the discussion to include consideration of the experimental results, interpretation of the results, and any uncertainty in the results. This section is generally no more than one to two pages in length. In the discussion, the most important thing to remember is that the discussion is NOT just a re-wording of the experimental results. The discussion section usually begins by quickly re-stating the hypothesis and the results, and then it dives deeper into the meaning and interpretation of the results. This section is used to discuss or explain why the results do or don’t fit the initial hypothesis, as well as,