

LESSON PLAN

Topic: Chemical Measurements: Precision and Accuracy

Goals:

Students will:

- Use scientific method to identify the best personal practice for pipetting liquids
- Demonstrate understanding of density: density of water is 1g/mL
- Practice pipetting and analytical scale techniques
- Perform basic statistical analyses
- Create simple visuals to display data
- Demonstrate data collection and recording abilities

Materials:

- 1 Laptop per group, equip with Microsoft Office, Excel
- 1 Pipettor per group
- Pipette tips
- 1 analytical scale per group
- Weight boats
- Deionized water

Procedures

Introduction:

- Discussion of general pipetting methods (forward method compared to backward method)
- Overview of density properties (density of water is 1g/mL)
- Discussion and demonstration of analytical scale (taring, airflow, units)
- Description of data table creation

Activity

- Students for small groups
- Students begin by discussing research design (how many replicates, etc)
- Students take turns pipetting a pre-determined volume (100, 500, 1000 μ L) of deionized water into weigh boat on analytical scale until the designated number of replicates has been performed for each student. Students do this for both methods of pipetting
- The weight (grams) of each pipet round is recorded in a created data table in Microsoft Excel for each student
- For each student, the average and standard error are calculated under each volume.
- For each student and volume, a t-test is used to compare pipetting

methods

Assessment

Student: Students are graded on participation of the activity and the ability to answer questions regarding volume, weight, and density. Additionally, students are required to outline the activity in terms of the scientific method.