Krug Chemistry – Deep Run Daily Planning Guide

Date of Lesson: Q1 Day 7 – Percent Error, Dimensional Analysis

Topic /Big Questions: (Question Stems & Question Creation Chart)

- **How is accuracy different than precision?**
- **What is the percent error in my calculations?**
- **What is dimensional analysis?**
- **How can I use dimensional analysis to convert units of measurement?**

State SOL	Unpacking the Standards (Video explanation shown at 3:18)
CH 1 d, e, g - j	d) manipulation of multiple variables, using **repeated trials**; e) accurate recording, organization, and **analysis of data** through repeated trials; g) mathematical manipulations including SI units, scientific notation, linear equations, graphing, ratio and proportion, significant digits, and **dimensional analysis**; h) use of appropriate technology including computers, graphing calculators, and probeware, for gathering data, **communicating results**, and using simulations to model concepts; i) construction and defense of a scientific viewpoint; and j) the use of current applications to reinforce chemistry concepts.

Visible Learning (For the three items with asterisks*, think from a student perspective. Use simple language)

***What am I learning today?** Accuracy, Precision, Percent Error, and Dimensional Analysis

***Why is it important?** Accuracy, precision, and percent error will determine the validity of data. Dimensional analysis is used by chemist to convert units of measurement.

***How will I know I've learned it?** I will be able to identify whether or not data is accurate and/or precise. I will be able to calculate percent error. I will understand the pattern for setting up a dimensional analysis equation.

Differentiation strategies:

Guided Instruction – Error and Dimensional Analysis Power Point

Percent Error Scenarios – students will use white boards and CER techniques to evaluate error in recorded data

Modeling Instruction – guided questions to investigate patterns in data and dimensional analysis

Accommodations and/or modifications are being met for students with IEP's/504's.

Access to all materials on Schoology; frequent checks for understanding; priority seating

Daily Plan/Sequence of Instruction:

Teacher will ask students to define the difference between accuracy and precision in order to better understand any misconceptions. Teacher will explain the true difference between accuracy and precision. Teacher will demonstrate how to calculate accuracy and precision of recorded data points.

Students will work in small groups to determine percent error for different scenario task cards. Students will use white boards and CER techniques to explain results to peers. (Claim = % error, Evidence = accepted value vs measured value; Reasoning = explain how calculations were done).

Teacher will explain that dimensional analysis is used by chemists to convert units of measurement. Students will use white boards to set up a dimensional analysis equation in order to calculate their age in seconds. Teacher will continue using PowerPoint presentation (and Guided Notes for college prep level) to demonstrate how to do one step, two step, and multi-step dimensional analysis equations. (Note: These DA equations are simple unit conversions that do not involve stoichiometry at this point in the year.)

Teacher will assign **Unit 1 Test Review** for homework. Unit 1 Test Review will be available online through Schoology. Students will have two attempts to earn the highest score. (College Prep students can earn 5 points extra credit toward the test if they score 80% or higher. Test Review must be done on time to earn extra credit.)

Assessments (List all formative/summative assessments used to check for understanding during this lesson. Summative assessments may occur during a different class period.):

White board Activities (formative)

After assessing today's lesson are you and your students comfortable moving forward with your next objective?

Yes - assuming teacher observes active participation in calculations and white board activities

No, remediation required to proceed – students, who are weak in math skills, need a lot of repetition of these concepts; students will have the opportunity to review these concepts in the Test Review homework assignment in the review before the Unit Test. I am also open during One Lunch for extra help.

Teacher reflection:

A trick for remembering the difference between a**cc**ura**c**y and prec**i**s**i**on:

- When you are measuring **accuracy**, you want to look for the **c**orrect answer. So look to see if the data is **c**lose to the true value. Notice how the two **c**'s are **c**lose together but they are far from the other **c**, this means that they *are not* accurate.
- When you are measuring **precision**, you want to pay attention to how far apart the data points are. Notice the two letter **i**'s are on either side of the **s**. This represents the **s**paces between your data points. It is okay for a little wiggle in your data points, ±1 in the digit of uncertainty, but more than that means the data lacks precision.

Patterns in Dimensional Analysis require units to cancel diagonally:

$$\left|\frac{\blacksquare}{1}\right|\left|\frac{\bigstar}{\blacksquare}\right|\left|\frac{\Delta}{\bigstar}\right| = \Delta$$