Krug Chemistry – Deep Run Daily Planning Guide

Date of Lesson: Q4 Day 4 – Electrolytes, Molarity, and Dilution

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

- **What determines the strength of solutions?**
- **Which solutes are the most soluble?**
- **How do solutions conduct electricity?**
- **How do chemists prepare solutions?**
- **How do chemists dilute solutions?**

State SOL	Unpacking the Standards (Video explanation shown at 3:18)
CH. 5	CH.5 The student will investigate and understand that solutions behave in predictable and quantifiable ways. Key ideas include a) molar relationships determine solution concentration; b) changes in temperature can affect solubility; c) extent of dissociation defines types of electrolytes; d) pH and pOH quantify acid and base dissociation; and e) colligative properties depend on the extent of dissociation.

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

***What am I learning today?** Solutions are homogeneous mixtures. Electrolytes are dissolved ionic salts, acids, and bases. Molarity is a measure of concentration in moles/liter. Diluting a solution makes it less concentrated.

***Why is it important?** Solutions are homogeneous mixtures in which the physical properties are dependent on concentration of the solute and the strength of the interactions among the particles of solute and solvent. Molarity is used to quantify the amount of solute in the liters of solution.

***How will I know I've learned it?** I will identify strong electrolytes. I will calculate molarity of a solution. I will calculate the amount of stock volume required to create the desired dilution. I will calculate the concentration of the dilution based on stock molarity and volumes used.

Differentiation strategies:

Electrolyte Lab & Worksheet

PhET Concentration
https://phet.colorado.edu/sims/html/concentration/latest/concentration_en.html

PhET Molartiy
https://phet.colorado.edu/sims/html/molarity/latest/molarity_en.html

Molarity Worksheet

Dilution Worksheet

Solutes, Solvents, and Solutions PowerPoint

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

Small group activities; frequent checks for understanding; materials available on Schoology;

Daily Plan/Sequence of Instruction:

Electrolyte Lab

If available, students will use **Vernier Conductivity Probes** to test the electrolytic strength of various solutions. Students will write dissociation equations for solids in their lab notebook, determine which ions are responsible for conductivity, and draw particle diagrams to indicate strength of dissociation.
https://www.vernier.com/experiments/cwv/13/properties_of_solutions_electrolytes_and_non-electrolytes/

If Vernier probe is not available, teacher can build a **homemade conductivity tester** as shown in this YouTube Video: https://www.youtube.com/watch?v=cHhGiKBGqB0

or watch the following YouTube **Electrolyte demonstration**: https://www.youtube.com/watch?v=1XWnovm6JLs

Follow up with this video to show how electrolytes are important to keep our body's healthy:
https://www.youtube.com/watch?v=l3VWb0mUS7Y

Assign the **Electrolyte Worksheet.**

Molarity

First, allow the students to get used to the idea that molarity is a measure of concentration. Use the **PhET Simulation called Concentration** (https://phet.colorado.edu/sims/html/concentration/latest/concentration_en.html). Tell students to click and drag the concentration tester into the water. Then show them how to add solid or solution, add or remove water, evaporate water, etc. Ask them what happens when all the water is gone. Answer: Crystallization!

Second, use the **PhET Simulation called Molarity** https://phet.colorado.edu/sims/html/molarity/latest/molarity_en.html). Show students how to change the solute level, solution level, and type of solute. Ask: "Which solutes become saturated?" "Why can't others become saturated?" "Why do solid crystals appear when a solution is saturated?"

Since you need to use NaOH for the titration lab next week, ask students calculate how many grams you will need to make a 0.100 M stock solution. Assume you need 1 Liter to make enough base solution for their class. Once they have correctly calculated the mass, go ahead and measure out the NaOH and prepare the solution. Show students how to add water to the tick mark on the volumetric flask. Label the flask 0.100 M Block #_, and set aside for titration lab.

Assign the **Molarity Worksheet**.

Dilution

Now obtain a stock solution of HCl. Show students the equation: $M_1V_1 = M_2V_2$. Tell them that you want to make a 0.300 M solution to use for the titration lab next week. Ask students to calculate the amount of stock solution required to make a 500 ml solution of 0.300 M HCl. Once they have the answer, transfer that amount into the 500 ml flask. Ask students "How much water needs to be added to create the solution?" Now fill the flask with water to the mark.

Assign **Dilution Worksheet**.

Assign **Solutes, Solvents, and Solutions PowerPoint** for homework.

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

Electrolyte Lab – (summative)

PhET Simulations – (formative)

Electrolyte Worksheet – (summative)

Molarity Worksheet – (summative)

Dilution Worksheet – (summative)

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

Yes – students can identify strength of electrolytes and calculate molarity and dilution equations.

No, remediation required to proceed – students who are struggling can come to One Lunch for tutoring