Research Experiences for Teachers (RET) – 2015

LESSON PLAN TEMPLATE

LESSON TOPIC:
Molarity of a solution

STANDARD(S) & INDICATOR(S):
CCSS Mathematics:
HSF-IF. Interpret functions that arise in applications in terms of the context.

OBJECTIVE(S): Students will be able to:
Prepare uniform solutions.
Calculate molarity for each prepared solution.

MATERIALS:
Hot plate
Beakers-100ml ,200 ml
Weighing dishes
Stirring rod
100ml graduated cylinder
Balance
Safety equipment: goggles, gloves, and apron.

LIST OF HANDOUTS (attach original copies of each handout - teacher & student edition)
1 Worksheet

BACKGROUND INFORMATION:
The students will review information about solution concentration and molarity. They will connect this knowledge to future activities.

CLASSROOM ACTIVITY DESCRIPTION (LABORATORY/EXERCISES/PROBLEMS) including detailed procedures:
Exercise procedure:
Make Three uniform solutions for given formulas:

- Formula-1-100 ml of water +10 g of salt
- Formula-2-80 ml of water +10 g of salt
- Formula-3-70 ml of water +10 g of salt

Write final procedure for the exercise

Individually solve the problems for formula 1-3, and bring the answers to next class

SAMPLE QUESTIONS TO ELICIT CLASS DISCUSSION:
What is concentration? What is molarity? How chemical reactions change the concentrations of solutions?

HOMEWORK ACTIVITY/EXERCISES/PROBLEMS:
1. Finish the written procedure.
2. Calculate molarity for each individual formula.

PARAMETERS TO EVALUATE STUDENT WORK PRODUCTS:

1 Written procedure step by step for how to making uniform solution. (Please write all the details).
2. Calculation –Calculate molarity for each individual formula.

REFERENCES:

Lesson#1 is part of chapter 4 witch I am teaching beginning of the school year

ACKNOWLEDGEMENT

This material is based upon work supported by the National Science Foundation under Grant No. 1301071

Supporting Program: Center for Pre-College Programs, at the New Jersey Institute of Technology
Contributors
Barbara Safira, Wallington High School, Wallington, NJ, Primary Author
Howard Kimmel, Levelle Burr-Alexander - Center for pre-College Programs, NJIT.
Lu Zhang, Dr. Rajesh Dave - C-SOPS, NJIT

MOLARITY (M)

Name _____

$$\text{Molarity} = \frac{\text{moles of solute}}{\text{liter of solution}}$$

Solve the problems below.

1. What is the molarity of a solution in which 58 g of NaCl are dissolved in 1.0 L of solution?

_____

2. What is the molarity of a solution in which 10.0 g of $AgNO_3$ is dissolved in 500. mL of solution?

_____

3. How many grams of KNO_3 should be used to prepare 2.00 L of a 0.500 M solution?

_____

4. To what volume should 5.0 g of KCl be diluted in order to prepare a 0.25 M solution?

_____

5. How many grams of $CuSO_4 \cdot 5H_2O$ are needed to prepare 100. mL of a 0.10 M solution?

_____

NJIT New Jersey's Science & Technology University

Research Experiences for Teachers (RET) – 2015

LESSON PLAN TEMPLATE

LESSON TOPIC:
Disintegration of Alka Seltzer-Rate of Reaction

STANDARD(S) & INDICATOR(S):
Next Generation Science Standards:
HS-PS1-5. Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.
CCSS Mathematics:
HSF-IF. Interpret functions that arise in applications in terms of the context.

OBJECTIVE(S): Students will be able to:
Collect and compare the data of measurements during chemical change of reaction of Alka Seltzer at different temperatures and for different concentrations of drug as function of time.

MATERIALS:
- Safety equipment (goggles, apron, gloves)
- 100-mL Graduated Cylinder
- Thermometer
- Hot plate
- Ice
- Stopwatch
- 4 Alka Seltzer tablets
- Tongs
- 250-mL Beaker

LIST OF HANDOUTS (attach original copies of each handout - teacher & student edition)
Lab Procedure
Questions

BACKGROUND INFORMATION:
The rate of a reaction is the time required for a given quantity of reactants to be turned into product(s). The rate of a reaction is determined by many factors including the nature of the reactants, the concentration of the reactants, the temperature, the presence or absence of a catalyst, and the pressure (for reactions involving gases). Alka Seltzer tablets contain heat-treated sodium bicarbonate, citric acid, and a salicylate analgesic. When the tablet is placed in water, the following reaction occurs:
$3NaHCO_3 + H_3C_6H_5O_7 + H_2O \rightarrow C_6H_5O_7Na_3 + 4H_2O + 3CO_2$
Design an experiment to study the effect of temperature on the reaction rate of Alka Seltzer in water. Check with the instructor regarding how many Alka Seltzer tablets are available for each team.

CLASSROOM ACTIVITY DESCRIPTION (LABORATORY/EXERCISES/PROBLEMS) including detailed procedures:

To study the effect of temperature on the reaction rate of Alka Seltzer in water. Students will be given materials and equipment for designing lab procedure, data table, and a conclusion. Students will collect data in the table and make graphs (time vs. temperature) for each set of measurements (different concentration).

SAMPLE QUESTIONS TO ELICIT CLASS DISCUSSION:

What are some of the variables that could affect the rate of reaction?
What factors might make one type of effervescent tablet more effective than another?

HOMEWORK ACTIVITY/EXERCISES/PROBLEMS:

Submit individual laboratory reports containing:

- Design of laboratory procedure.
- Data tables and graphs.
- Discussion/Conclusions of how changes in temperature and of concentration affect the rate of chemical change.

REFERENCES:

Lesson#1 is part of chapter 4 witch I am teaching beginning of the school year
Lessen#2 is part of chapter 12.This two lesson are not connected but I see why you may think they are. In science everything is connected.

ACKNOWLEDGEMENT

This material is based upon work supported by the National Science Foundation under Grant No. 1301071

Supporting Program: Center for Pre-College Programs, at the New Jersey Institute of Technology
Contributors
Barbara Safira, Wallington High School, Wallington, NJ, Primary Author
Howard Kimmel, Levelle Burr-Alexander - Center for pre-College Programs, NJIT.
Lu Zhang, Dr. Rajesh Dave - C-SOPS, NJIT

PARAMETERS TO EVALUATE STUDENT WORK PRODUCTS:

Lab Report Components	Comments	Points
Title		5/5
Objective		10/10
Materials		5/5
Procedure		10/10
Data		25/25
Observation		10/10
Calculation		10/10
Conclusion		15/15
Participation		10/10