LESSON TITLE	Concentration of Saltwater				
SUBJECT (S):	Chemistry, Physics, Biology, Earth Science				
GRADE LEVEL:	6-12	**AUTHOR:**	Becky McKinney, MS		
TYPE OF LESSON (activity, lab, project…)	Lab			**DAY(S):**	1 day

OBJECTIVE

Make a model of a water molecule and explain why it is bipolar. Identify properties of saltwater. In a collaborative group, design and construct a method for testing the salinity of saltwater.

NGSS/CC STANDARDS

NGSS
Science and Engineering: 1,2,3,4,5,6,8
Crosscutting Concepts: 2,4,6,7
Core Ideas: ETS1.B

PERFORMANCE EXPECTATIONS
Earth and Space Science: HS-ESS2-5, MS-ESS3-3
Physical Science: HS-PS1-1, HS-PS2-5, MS-PS1-1
Engineering: HS-ETS1-2, HS-ETS1-3, MS-ETS1-3, MS-ETS1-4

CC MATH
HS – MP.2, MP.4, HSN-Q.A.3; MS – MP.2, MP.4, 6.SP.B-4, 7.RP.A.2

CC ELA
HS – WHST.9-12.1; MS – SL.8.5

ASSESSMENT(S) & GRADING/RUBRIC

Worksheet filled out accurately. You could offer extra points for those who accurately determine salinity.

SUBJECT AREA(S):

Biology (properties of water, ecosystems), Chemistry, Physics (electricity), Earth Science

TEXTS/MATERIALS/TECHNOLOGY/AUDIO-VIDEO/OTHER RESOURCES:

Per Group: Beakers or cups, 4 unknown saltwater samples, distilled water, ping pong balls, conductivity testers, graduated cylinder, pH paper

For Class: 500 mL 2% saltwater solution, 500mL 5% saltwater solution, 500 mL 10% saltwater solution, balance

Teacher: PowerPoint, digital projector for introduction, worksheet (1/student)
If you do not HAVE a conductivity tester, you can make your own. Here is a suggested site:

http://www.exo.net/~emuller/activities/chemistry_summer_2007/Conductivity%20tester.pdf

INSTRUCTIONAL STRATEGIES/PROCEDURES/GROUPING:

Pass out the worksheet to the students. Using the PowerPoint, teacher will facilitate lesson (see PowerPoint)

Have students work in teams of up to 4 to test for salinity. Provide at least 20 minutes for students to experiment. Allow groups to have a small sample of known saltwater solutions (no more than 20mL per group).

If there is additional time, have students GRAPH their data.

SAFETY/SECURITY ISSUES:

Be cautious that students do NOT taste the saltwater. If students have not used a conductivity tester before, make sure that they know how to use it properly.

NOTES/REFLECTIONS/EXTENSIONS:

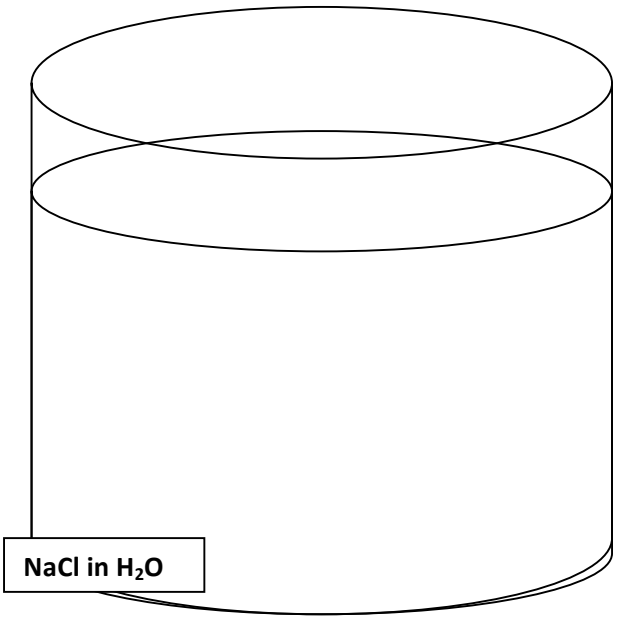
NAME _____ Date _____

Concentration of Saltwater

HYDROGEN ATOM

OXYGEN ATOM

WATER MOLECULE



NaCl in H_2O

Properties of Water

PURPOSE: Design a method to determine the percent of saltwater (salinity) in each container. It must be efficient, effective and minimize use of resources (CHEAP!). Once you have tested your samples and are sure about your results, see the teacher for the actual answer. Calculate the % error between the actual and your guess. If you are within 5% of your guess then your method was effective!

METHOD: Describe your method for testing the samples.

DATA: In the space below, write down your observations and data that you collect.

RESULTS: Fill in the table.

SAMPLE	GUESS % salt	ACTUAL (see teacher)	% Error

$$\frac{actual - guess}{actual} x100 = \%error$$

CONCLUSIONS: Was your method accurate for testing the salinity of the samples? EXPLAIN