Lesson Plan

Determination of Water Surface Tension

Lesson 1, Date: 14th July, 2005

1st Grade of Amaki Super Science High School

"Environmental Chemistry in English"

Duration: 50 nm

Objective: - To determine surface tension of water by dropping method.

- To investigate the effect of detergent on water surface tension.

Time	Key Contents	Teacher's activity	Students' activity
15 min	**Introduction** -Importance of water: Water is fundamental to life on the earth. Humans, plants and animals require water intake to survive. The world as we know it would not exist without water. The earth is 70% water, and human bodies are 71% water. Water is also used to generate energy and grow our food. It is essential for industrials production. Water helps determine our climate and provides habitat for thousands of plant and animal species.	-Ask students to think within group to answer following questions: What do you know about water? -I am going to demonstrate all of you one phenomenon of water properties, then I will ask you what kind of this property? Demonstrate about water strider which can be floated on water and will be sunk after giving a drop of detergent into water.	-Discuss in group and write down ideas on given paper and then explore those ideas on the board. -Observe the demonstration and answer question.

	-Water properties: Water has a number of unique properties. One of those is **Surface tension**. -Surface tension of water is caused by "cohesion" which is the force that causes water molecules to be attracted from one to another. Water molecules on the surface are pulled on by molecules on the sides and below the surface strongly by hydrogen bonds which results in a continuous tension. This tension acts like a thin film on the top of the water. This can help water strider, paper clip or 1 yen coin to float on water. Same reason causes drops of water to be spherical. - The surface tension of water can be destroyed in the present of soap or detergent in water. Hydrogen bonds between the water molecules are destroyed that causes water molecules to "slip past" one another. Small objects, such as a paper clip or 1 yen coin	-This demonstration shows the surface tension property of water. What is surface tension? Keep this question as an assignment for students to answer in the next lesson. -Today, we will determine the surface tension of water and its effect by detergent through weighing water drops. Before doing experiment, can you predict what happen to the weight of water drops after detergent existing in water? Ask students to select following ideas: ① Weight becomes heavier. ② Weight becomes smaller. ③ Nothing changes to water drops. To clarify your ideas, let conduct experiments.	-Students select one answer that they think it is appropriated.

	that might have floated on the water's surface are not able to after the soap is added.		
15 min	Experiment	-Explain the experiment procedure and then facilitate students' activity	- Conduct experiment by group. - Record experiment result into worksheet.
13 min	Discussion of experiment result	-Ask student from each group to record their experiment results on blackboard and to plot a graph showing the relationship between detergent concentration and water drops. -Facilitate students to answer the question in worksheets by as them to fill in the sentences on blackboard.	-Fill up their results by group into table prepared on blackboard. -One of student comes on blackboard and plots a graph according to their results. -Complete the sentences in their worksheets.
2 min	Demonstration of marbling Giving one drop of oil pain onto water, oil pain is spread out in large area as thin layer on surface water, whereas onto detergent water oil pain is spread out small area.	Demonstration of marbling	

5 min	**Assessment**	Explain assessment activity to students that they will conduct by group after the class. "By group, let determining the surface tension of water and measuring the amount of detergent presents in that water in various places in Amaki city."	Listen and ask questions if they don't understand.