Oil Eliminators

AIChE Community Affiliation (Rowan University AIChE Student Chapter)

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| 1. Objective | Environmentally friendly procedure to most effectively remove oil spills from bodies of water |
| 1. Materials | 7 FL OZ of Dawn detergent½ Gallon of Olive oil10 plastic containers for a class of 20 studentsEveryday items such as filters (coffee-making filters, face masks, T-shirts)Splash gogglesPaper towelsNitrile glovesTable SaltBaking Soda |
| 1. Procedure | The age group of students between 8-14 yrs can participate in the procedure mentioned below:   1. Put on all the required safety PPE including gloves and splash goggles 2. Place the plastic container on the table 3. Pour 1/2 gallon of water into the container 4. Pour approximately 500 ml of Olive oil into the container 5. Use a face mask/coffee filter as a filter to attempt to remove the most oil from the water 6. Temporarily put the mask/filter on a stack of paper towels 7. Add 3 squeezes of Dawn detergent, 1 tablespoon of salt, or 1 tablespoon of baking soda into the container based on the students’ decision 8. Stir the tub with a paint stick 9. Use a fresh face mask/coffee filter to attempt to remove oil from the water 10. Place the second face mask/filter beside the first face mask/filter on the stack of paper towels 11. Compare the previous face mask/filter without the soap and the second face mask/filter with the soap 12. Now compare the different setups to determine which filter and surfactant was most effective in removing the oil from the water 13. Instructor use: have the students discuss amongst themselves the physical property changes of the oil and water with and without soap/other binding agents. 14. Instructor use: have the students discuss the difference in filtration and cleanup between the oil spill without using soap and with using soap. 15. Instructor use: have the students discuss why some setups using soap were most effective in cleaning up the oil spills. |
| 1. Theory | Many oil spills occur in U.S. waters each year. These spills adversely affect aquatic life (sea birds, fishes, turtles, etc.), wildlife, and human health. Therefore, they have raised severe environmental concerns for decades. There are several different methods to respond to oil spills in seas, oceans, and freshwater reserves. These methods include in-situ burning, skimming, and the use of chemical dispersants. While this surface oil can be removed by skimming or burning, these techniques have their potential limitations and drawbacks. For example, the burning of oil generates carbon dioxide and creates air pollution). An alternate strategy is to disperse the surface oil into small droplets with the use of chemical dispersants through a process called emulsification.  Through this activity, we introduce the students to the use of chemical dispersants for cleaning spills. Chemical dispersants such as surfactants break the oil masses into small droplets allowing them to be removed easily and effectively through the use of filters. Furthermore, the smaller droplets of oil become more readily available to natural microbes present in the water bodies that will eat them and break them down into less harmful compounds. In our simple activities, the students are provided with the opportunity to explore the use of chemical dispersants in the form of our daily-use products such as Dawn detergent soap for learning methods to remove the oil spills. The students learn how basic chemical engineering fundamentals can help to solve the real-world problems that our society needs help with. |