

OIL SPILL EXPERIMENT Worksheet

MATERIALS

In order to complete this investigation you will need the following supplies for each group:

- Simulated Crude Oil -approximately 25mL
- Tap water
- 1 10mL syringe
- 1 plastic fork (to probe and remove materials)
- Dish soap (any brand)
- 1 gram of Loose Wool
- 1 gram Raw sheep fleece for boom
- 1 nylon stocking for boom
- 1 gram of Wool Blanket (non-woven)
- 0.5 grams of Oil Absorbing Polymer
- 3 grams of Recycled Cellulose Material
- 1 plastic sandwich size bags
- 1 pair of gloves per person
- Paper towels to clean up spills

PROCEDURE

1. Examine the four oil cleanup materials. What do you notice about each one? What are their relative densities to one another? Are any of the materials similar? Record your observations.
2. Fill a Petri dish bottom (deeper half) halfway with water and add 3ml simulated crude oil on top.
3. Weigh out approximately 1 gram (approx.) of loose wool and record the exact mass, place wool on top of oil in the salt water.
4. Note how the wool soaks up the oil. Slowly stir the wool with a fork. Allow 30-60 sec. for the wool to absorb the oil. Remove the wool, add more oil, replace the wool and continue this process until it appears to be “saturated”. When the wool no longer absorbs the oil, the oil will begin to float on the surface of the water.
This is a subjective determination, so have the group agree when the experiment is complete!
5. Record the volume of oil that was absorbed by your loose wool
Calculate the Absorbancy Ratio (AR) = ml oil/g wool
6. Determine whether you can squeeze any of the absorbed oil back out of the wool. (Make sure to re-absorb any oil you squeeze out so you can start with no oil in the water for the step.) **Record if oil is recoverable.**
7. Repeat steps 2-6 using oil with 1 gram (approx) non-woven wool blanket (black).
Calculate AR = ml oil/g oil absorbing polymer.
Is oil recoverable?
8. Repeat steps 2-6 using oil with 1 gram (approx) woven wool blanket (light blue).
Calculate AR = ml oil/g oil absorbing polymer.
Is oil recoverable?
9. Repeat steps 2-6 using oil with 0.5 g (approx.) oil absorbing polymer.
Calculate AR = ml oil/g oil absorbing polymer.
Is oil recoverable?
10. Repeat steps 2-6 using oil with 3 g recycled cellulose material.
Calculate AR = ml oil/g recycled cellulose material.
Is oil recoverable?

11. Take 1 gram of raw wool and place it inside of a stocking. Secure with rubber bands or tie a knot and cut off extra stocking material.
12. Repeat steps 2-6 using oil with the wool boom.
Calculate AR = ml oil/g recycled cellulose material.
Is oil recoverable?
13. In your tupperware, add 5 ml oil to the surface, then slowly add 5mL of dish detergent and stir with a fork. Add more detergent as needed. This dish detergent simulates the **dispersants** being used in the Gulf. Record observations.
14. **Record your DATA for all absorbant materials on the data sheet provided.** This data will be later shared with the class for an analysis of the average absorbency ratio (AR) and experimental error (standard deviation).

DATA TABLE

Material	Weight of Material	mL of Oil Absorbed	Absorbency Ratio (ml oil/g material)	Oil Recovery?	Observations
Loose Wool					
Non-woven Wool (black)					
Woven Wool (lt. blue)					
Boom w/Wool					
Cellulose					
Polymer					
Dispersant					

Observation questions

1. Which material was the most effective (highest absorbency ratio)?
2. Which material was the easiest to use?
3. What material(s) seem to be recyclable – Can you use it again to absorb more oil?
4. Which material(s) might be hazardous to the environment? Why?
5. Which material do you think is the least expensive? Why?
6. Which material do you think is most expensive? Why?
7. As an engineer, what material would you recommend using to clean up the gulf oil spill? **Why?**
Take into account the effectiveness, the cost, the ease of use, effect on the environment, etc.

Brainstorming

How would your group engineer an oil spill clean-up method in the gulf? How would you get your material to the polluted waters? How would you remove the material? What would you do with the waste products? Use the space below to address these issues.