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## Types of Separations Worksheet

### Distillation

#### Materials needed

1 500 mL beaker	sheet of foil that fits atop beaker hot plate
1 graduated cylinder	1 Styrofoam cup
250 mL water	1 digital scale
15 g salt	1 weigh boat
1 glass stirring rod	1 spatula
4 pH strips	

#### **Instructions:**

- Pour 250 mL of water into a 500 mL beaker using a graduated cylinder.
- Dip a pH strip into the water and record the pH value below.
- Measure out 15 g of table salt and add it to the beaker.
- Use a glass stirring rod to stir the mixture until the salt completely dissolves.
- Dip another pH strip into the saltwater solution and record the pH value below.
- Shape a sheet of foil into a lid that fits securely on top of the beaker.
- Place the beaker on a hot plate set to high and heat until boiling.
- Allow the solution to boil for two minutes.
- Carefully lift the foil lid horizontally to capture any condensation, then turn it over to collect droplets.
- Wipe the water droplets from the foil with the spatula into a Styrofoam cup.
- Put the foil lid back on the beaker and continue boiling and collecting distilled water.
- Once you have enough distilled water, use a pH strip to measure its pH and record this value below.

#### **pH measurements:**

pH of water \_\_\_\_\_

pH of saltwater mixture \_\_\_\_\_

pH of collected water droplets \_\_\_\_\_

#### **Answer the following:**

Compare the pH values recorded for the initial water, the saltwater solution, and the collected distilled water. Does the distilled water have a different pH from the saltwater? Why?

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## Crystallization

### Materials needed

2 clear plastic cups	1 graduated cylinder
50 mL water	2 glass stirring rods
10 g Epsom salt	1 digital scale
10 g sodium carbonate	2 weigh boats

### Instructions:

1. Measure out 50 mL of water using a graduated cylinder or measuring cup and pour it into the first plastic cup.
2. Use a digital scale to measure out 10 g of Epsom salt.
3. Add the 10 g of Epsom salt to the 50 mL of water in the first plastic cup.
4. Stir the mixture with a stirring stick or spoon until the Epsom salt is completely dissolved.
5. Pour another 50 mL of water into the second plastic cup.
6. Use the digital scale to measure out 10 g of sodium carbonate.
7. Add the 10 g of sodium carbonate to the 50 mL of water in the second plastic cup.
8. Stir the mixture until the sodium carbonate is fully dissolved.
9. Slowly pour the sodium carbonate solution from the second cup into the Epsom salt solution in the first cup.
10. Stir gently while mixing to ensure the two solutions combine evenly.

### Observations:

### What do you think is occurring?

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## Adsorption

### Materials needed

1 250 mL beaker 100 mL water 100 mL vegetable oil	1 graduated cylinder 1 clean, absorbent sponge
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### Instructions:

1. Pour 100 mL of water into a 250 mL beaker.
2. Pour 100 mL of vegetable oil into the same beaker.
3. Take the clean sponge and gently place it on top of the oil layer.
4. Let the sponge sit for a minute or two in the mixture.
5. Carefully remove the sponge from the mixture.

### Observations:

What happened to the oil/water mixture after the sponge was added?

Why do you think this happened?

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## Membrane

### Materials needed

1 plastic cup 50 mL water strip of filter paper	1 graduated cylinder red food coloring blue food coloring
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**Challenge:** I made a mystery mixture, but I cannot remember how many drops of food coloring I put into the cup. I need your help in figuring out what the combination of red and blue drops was that I put into my cup. Your group is challenged to decide on a combination of four drops using red and blue. Each group should try a different combination, giving the class more options to compare the mystery mixture.

### **Instructions:**

1. Measure out 50 mL of water using the graduated cylinder and pour it into the plastic cup.
2. Drop your food coloring combination into the cup.
3. Place the strip of filter paper into the cup, bending the top over the edge so the paper stays in the cup and does not touch the edge.
4. Wait 5 minutes before removing the filter paper from the cup.
5. Display your filter paper on the board, along with your combination of food coloring that was tested.

### **Observations:**

**What combination of food coloring drops created the mystery mixture?**

**What evidence supports your claim?**

**Reasoning: How does the evidence support the claim?**

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## Absorption and Stripping

### Materials needed

1 laptop or tablet 1 empty cup 1 cup of water	1 clean, absorbent sponge hands for squeezing
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### **Instructions:**

1. Watch this video (4:26 minutes): <https://www.youtube.com/watch?v=s3LIYpgMiIE>
2. Fill one cup with water.
3. Submerge the sponge in the water.
4. Let the sponge absorb the water.
5. Take the sponge out of the water and squeeze it over an empty cup.

How does this activity demonstrate the process of absorption?

How does this activity demonstrate the process of stripping?

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## Extraction

**Instructions:** Watch this video (10:08 minutes): <https://www.youtube.com/watch?v=N96JaRnE7n0>

**Describe how this method works:**