Characterizing Emulsions

Now we will explore different emulsions (including your lotion!) and observe their physical characteristics to determine how stable (or unstable) they are. Here are a few of the metrics that scientists could use to characterize an emulsion. Observe the samples as a group and fill out the tables below.

Observe several phenomena about your sample overall.

Ratios

Read the label on the tubes and write down the ratios of water, oil, and emulsifier for each sample. Emulsifier used in this experiment is called **soy lecithin**.

	Percent Composition		
	Water (%)	**Oil (%)**	**Soy Lecithin (%)**
1			
2			
3			
Lotion			

Emulsion State

Take a look at your sample and describe the emulsion state.

- Is your sample uniformly emulsified?
- Do you see pockets of water/oil/soy lecithin?
- Do you see oil layers forming?

	Emulsion State
1	
2	
3	
Lotion	

Texture

Take a look at your sample and describe the texture.

- Is your sample sticky?
- Is your sample watery?
- Is your sample in between the two?

	Texture
1	
2	
3	
Lotion	

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Take small amounts of each sample for each subsequent test.

Conductivity

Transfer some of your sample to a cup and hold the conductivity tester in the sample.

- Record the level of conductivity reported by the meter.

	Conductivity Metric (out of 10)
1	
2	
3	
Lotion	

Viscosity

Follow the Viscosity Protocol for viscosity test and write down the viscosity index for each sample.

- How sticky is your sample?

	Distance (cm)	Viscosity Index
1		
2		
3		
Lotion		

Dye Test (Optional)

Transfer a pea-size drop of each sample to a glass plate. Add one drop of dye, mix well with a toothpick, and write down and compare the colors of each sample-dye combination.

- Red Food Color
- Oil Red O

	Oil Red O	Red Food Color
1		
2		
3		
Lotion		

Discussion Questions

1. What ratio(s) of water/oil/soy lecithin produced the most stable emulsion?

2. What can you tell about the relationship between ratios of water/oil/soy lecithin and emulsion stability?

3. How did your lotion compare with any of the samples? Was it similar to any of the sample? Different?

PROTOCOL

Viscosity Test

Material:

- Samples
- Your Lotion

Equipment:

- Pipette stand/clear smooth surface
- Consistometer Paper
- Pipette
- Pen
- Calculator

Protocol:

1. Using a pipette, take up a bit of the sample.
2. While tilting the pipette stand/clear surface so the incline part becomes **parallel** to the floor, drop appx. 2-3 droplets of the sample on top of one of the four purple dots (make sure the sample fits the dot).
3. Angle the surface to begin the experiment while simultaneously starting the timer for **30 seconds**, and mark/record how far each sample goes at the end of the 30 seconds.
4. Take the **multiplicative inverse (1/distance)** of the distance traveled by the sample to approximate viscosity.
5. Record the viscosity category according to the standards below (in units of cm^{-1}).
    - <0.2 : Low Viscosity
    - 0.2-.0.5: Medium Viscosity
    - >0.5: High Viscosity
6. Compare viscosity values with other groups and your lotion. What can you hypothesize about the relationship between viscosity and emulsion state?

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