

Experiment 2

Components of a Mixture – What Is That Stuff in the Bottom of the Cereal Box?

For the Instructor

The mixture per student should contain approximately 5 mg red #40, 100 mg Fe, 100 mg ZnO, 200 mg stearic acid, and 395 mg sucrose per gram. If the sucrose crystals are large, they might take a considerable time to dissolve, and grinding the sucrose before making the mixture is advisable.

The concentration of the methanol solution from 200 to 5-10 mL will take longer than a single lab period. This process can be facilitated by placing in a well-ventilated hood. During the following week, someone will need to check these and move them to a freezer at the appropriate time. Very little time will be required during the next laboratory period to complete the experiment.

This experiment can be performed much faster if gravity filtration is replaced with the use of a Buchner funnel, filter flask, and vacuum source.

Preparation Information – 24 students

Methanol	~6 L
Chloroform	<500 mL
(mixture – 25 g)	~25 g per section
Iron fillings	2.500 grams
Zinc oxide	2.500 grams
Sucrose	9.875 grams
Red #40	0.125 grams
Stearic acid	5.000 grams

Necessary Equipment – 24 students

Paper towels	
Disposable gloves	
Filter paper	
Weigh boats/weighing paper	
Funnel	1 per student
Beaker (20 mL)	2 per student
Beaker (400 mL)	2 per student
10-mL graduated cylinder	1 per student (optional)
100-mL graduated cylinder	1 per student (optional)
Ring stand	1 per student
Iron ring	1 per student

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Clay triangle	1 per student
Stirring rod	1 per student
Wash bottle	2 per 1-4 students
Spatula	1 per student
Bar magnet	1 per 1-4 students
Rubber policeman	1 per student
Magnetic stirrer/hot plate	1 per 2-4 students (optional)
Balance	4-5 per room

Answers to Pre-Laboratory Questions

1. How could you determine (without tasting) whether a container of a colorless liquid contained ethanol or ethanol and sucrose?

Allow the ethanol to evaporate; a white crystalline solid left would indicate the presence of sucrose.

2. Does this experiment demonstrate the law of conservation of matter?

No. No chemical reactions are involved, only physical separations.

3. Explain the difference between filtration and decantation (see the “Experiment Equipment and Procedures” section of this manual). Why might one want to use filtration in this experiment rather than decantation?

Decanting works if solid(s) stay at the bottom of the container. If they are likely to be disturbed, then filtration should be used.

4. How could one rapidly separate red #40 from zinc oxide? Indicate every step.

Add water and agitate to dissolve the red #40. Filter and wash the solid with water. Solid remaining is zinc oxide.

5. Separation techniques are performed on a sample containing sand and salt. It was determined that there were 5.43 g of sand and 4.52 g of salt. The total sample weight was 10.50 g. What is the percent recovery of sand from the sample?

$(5.43 \text{ g} + 4.52 \text{ g})/10.50 \text{ g} \times 100\% = 94.8\%$