

Background information

Year 7, unit 1: Mixing and separating

Applications of separation techniques

Everyday applications for separation techniques in the home

Evaporation

- Clothes drying in the dryer or on the washing line.
- Evaporating water to retrieve salt or sugar.

Filtering

- Using a jug with a filter so water from the tap can be filtered for drinking.
- Using a coffee filter for filtering coffee.
- Using a tea strainer or tea bag.
- Filters in pools, air conditioners, vacuum cleaners and car engines.

Sieving in cooking

- Removing rice or pasta from cooking water.
- Sifting flour or other ingredients.
- Separating an egg.
- Washing lettuce in a salad spinner.

Other separation techniques not seen in the home

Distilling

- Distillation of alcohol.
- Distillation of essential oils from plants.
- Distillation of crude oil to obtain fuels for vehicles.
- Distilling salt water to produce fresh water.

Evaporating

- Obtaining salt from salt water.
- Producing a thin metal layer on plastic film.
- Producing dried foods (eg instant coffee, dried peas and beans, dried fruit).
- Producing dried versions of antibiotics and vaccines so they last longer and don't need refrigeration.

Filtering

- Removing solids from water.
- Sewerage treatment.
- Filtering blood to separate cells and plasma.

Familiar professions that use separation techniques

- Chemists – decanting, filtering, distilling, chromatography.
- Pharmacists – decanting, filtering.

- Chefs – decanting, sieving, filtering.
- Dentists – safe disposal of mercury fillings (filtering).
- Miners – jigging and panning, hand picking.
- Archaeologists and geologists – sieving, sifting, hand picking.
- Doctors – chromatography for blood processing, filtering blood, testing blood.
- Farmers – winnowing, threshing, filtering, decanting.
- Industries such as water treatment plants, sugar mills, factories, refineries.
Processing plants also use a range of separation techniques.

Lesson 1: making sherbet

In this activity students investigate how changing the proportions of the components of a mixture changes the properties of the mixture. As the students will taste the ingredients, ensure all equipment is clean. Dispose of used sandwich bags, paddle pop sticks etc.

Safety advice: This activity should not be performed in a science laboratory as there could be contamination of the ingredients being ingested.

Materials (for a class of 25)

- 2 paddle pop sticks per student (1 scoop = 1 paddle pop stick)
- 100 g icing sugar
- 2 packets jelly crystals
- 20 g citric acid
- 20 g tartaric acid
- 20 g bicarbonate soda
- 3 sandwich bags/student

Procedure

1. Make students wash their hands before they start. Emphasise hygiene in this activity.
2. Place a scoop of each ingredient **in the following order** on the palm of each student's hand. Students record the taste of each sample in the table provided. Don't identify the name of the ingredients
 - A. icing sugar
 - B. jelly crystals
 - C. citric acid
 - D. tartaric acid
 - E. bicarbonate soda
3. Each student follows the standard recipe by collecting ingredients in a sandwich bag from the stations previously set up by the teacher.
4. Students taste their sherbet and decide which ingredient they would like to change. They have three opportunities to change the taste of their sherbet by changing one ingredient at a time. Remind students to label their bags.
5. Students select their most successful recipe to take home.

Discussion

1. Identify the ingredients that tasted good and those that didn't taste good.
2. Discuss why the ingredients that didn't taste good were in the sherbet.
3. Compare recipes and highlight the fact that while the ingredients are the same, the taste and fizzing effect of these is dependent on the proportions.
4. Ask the students to write a conclusion relating the proportion of the components of a mixture to its properties.

Lesson 2: separating a mixture of beans, rice and flour

Prior to the lesson make up a mixture of dried beans, uncooked rice and plain flour. Place a small quantity of the mixture in plastic cups – enough for one cup per group.

Suggested equipment

- protective clothing, to prevent flour going all over students' clothes
- large plastic dinner plates or large aluminium pie trays (at least 2 per group)
- 2 plastic cups (per group) for collecting separated components
- sieves (preferable one per group but these can be shared). If there aren't enough sieves available, students could construct their own by putting small holes in a piece of plastic wrap and pouring the mixture into this
- newspaper, for easier clean up or to catch the flour if they choose winnowing

Possible procedure

1. Pour the mixture onto a plate and use hand picking to remove the beans.
2. Place the separated beans in a cup.
3. Pour the rice and flour mixture into a sieve. Hold over a plate and shake to separate the flour (winnowing).
4. Place the separated rice and flour in different cups.