Grade 6 Science

Week of November 30– December 4

Industrial Processes Involving Mixtures

Separation of Milk

Separating mixtures is an extremely important industry worldwide. Many industries separate mixtures to produce pure products for us to use in our daily lives.

The separation of mixtures is a significant industry. It uses many different separation techniques and requires extremely large equipment to separate large enough quantities for the consumer. Many of the mixtures that are separated may be a surprise. We consume them but may not question the process used to create them.

Example:

Canada produces 7.3 billion liters of milk each year. How much milk do you drink a day or use with your cereal? Milk is a mixture of cream (fat) and skimmed milk, and it needs to be separated. A centrifuge and other processes are used to separate the heavy cream from the skimmed milk.

Raw Milk is a Mixture

Raw Milk is not pasteurized or homogenized, it comes straight from the cow. It is a mixture of cream (fat) and milk.

The milk we purchase in a store has undergone several processes. One process is separating the milk and the cream using a large centrifuge.

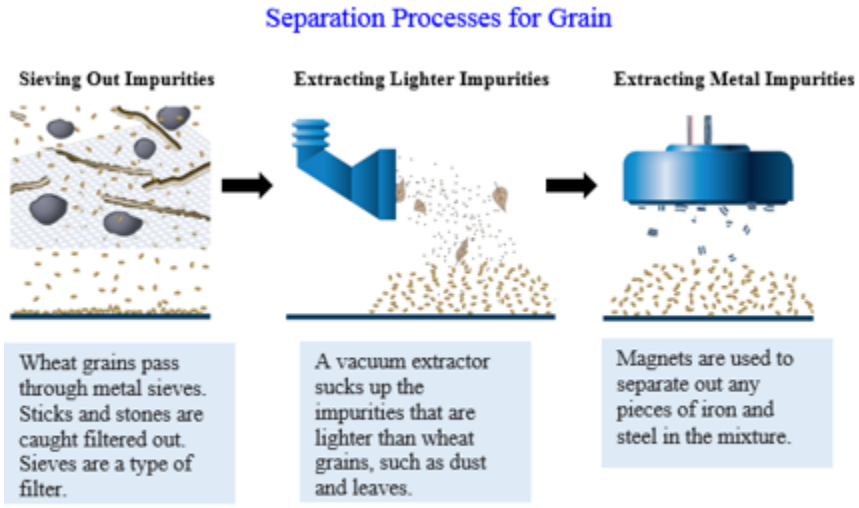
Images adapted from Weston. A price Foundation and the Dairy Farmers of Canada

We will focus on two of the more common industries that separate mixtures: the **flour industry** and the **petroleum industry.**

The Flour Industry

Many of the baked goods we consume like bread, cake, and cookies come from wheat flour.

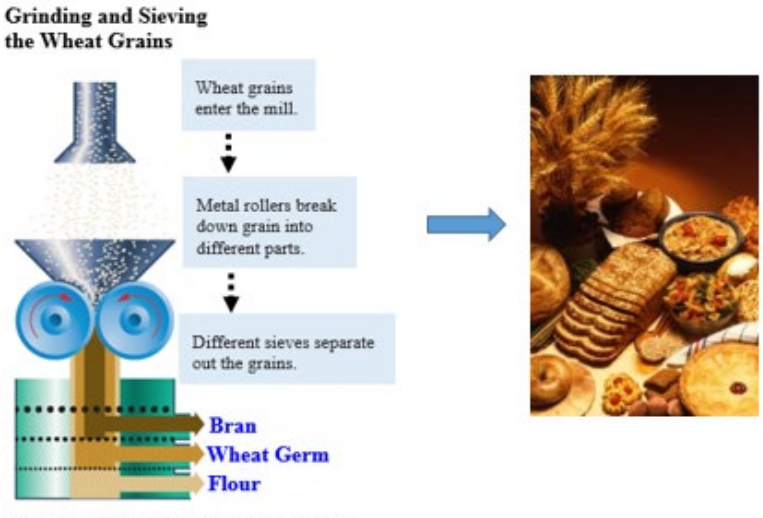
Wheat flour has to be made from ground wheat grains, and nothing else. When wheat grains arrive at a flour mill it may be mixed with many other substances like dust, sand, metal splinters, or even parts of other plants. The wheat grains must be separated from the rest of these impurities. Many different separation processes are used to get a pure grain product.



Images adapted from Nelson Science

Milling the Wheat

The wheat grain is then ground and separated into its three main parts; the **endosperm** (flour), **bran**, and **wheat germ**. 'Milling' is when metal rollers break open the wheat grains. The milled mixture is passed through a series of different sized sieves (filters) to separate the flour, bran, and wheat germ from each other. The products can then be sold and used separately.



Images adapted from Nelson Science and Health Canada

The grain separation process creates pure products (bran, wheat germ, and flour), that we use to make many products we enjoy.

Watch this video to see how a sieve works: https://youtu.be/Qt2OZsuL2vQ

Separation of Crude Oil

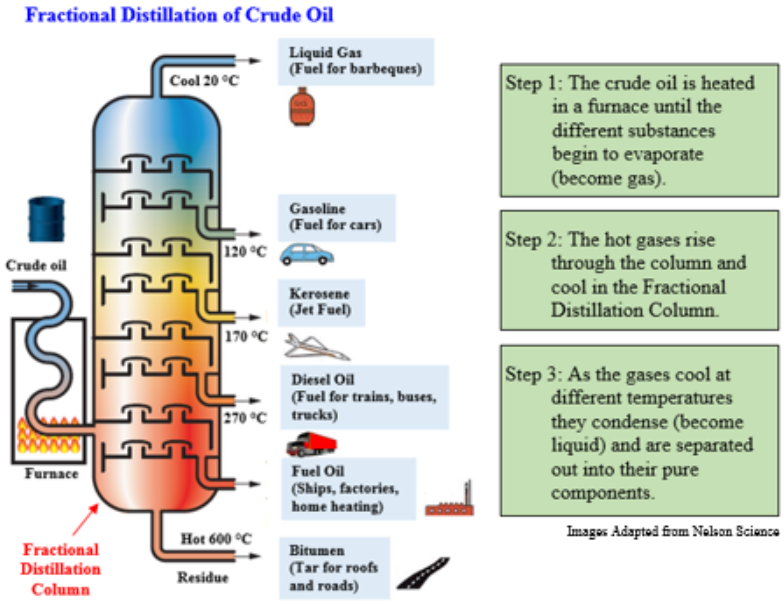
The Petroleum Industry

Petroleum is an important product in our everyday lives. Many products are made from petroleum, including plastics, asphalt, many medicines, synthetic fibers, and even fertilizers. Most fuels that power cars, trucks, trains, and airplanes also come from petroleum. Petroleum, or crude oil, is a homogeneous mixture of many pure substances found deep in the ground. Petroleum must be extracted and then refined using **fractional distillation**.

Extracting Crude Oil

Images adapted from Flickr

Petroleum comes out of the ground as a thick, liquid mixture that is made up of many different substances. Each part of the mixture boils at a different temperature. Scientists have developed a technology to separate the different components.



Images Adapted from Nelson Science

This looks like a really complicated procedure but it is really just separating the pure components from the crude oil using different boiling points, evaporation (liquid becoming vapour or gas), and condensation (gas or vapour becoming liquid). This is very similar to the simple distillation process we learned about earlier.

Watch this video to see how crude oil is extracted, transported, refined, and used: https://youtu.be/PYMWUz7TC3A

Industrial Processes Involving Mixtures

1. Choose one of the industrial processes introduced in the course (Making Flour or Separating Crude Oil) and create a flow chart that summarizes the steps in the process.