2.   Separation methods

Most substances that we're familiar with in everyday life are mixtures composed of two or more pure substances. Ask the students for examples of applied separation processes from their daily lives (separation of household waste, etc.). (Teaching methods: "think-pair-share" or "Flashlight").

Food labels must list ingredients. Provide a bag of instant soup and have the students recognize and sort the different ingredients. The students quickly realize that we can recognize and sort out the different substances with the help of our senses. For mixtures to be separated, the contents' properties must differ. In the case of the soup, for example the different colours, sizes, shapes, smells and tastes help us separate the ingredients.
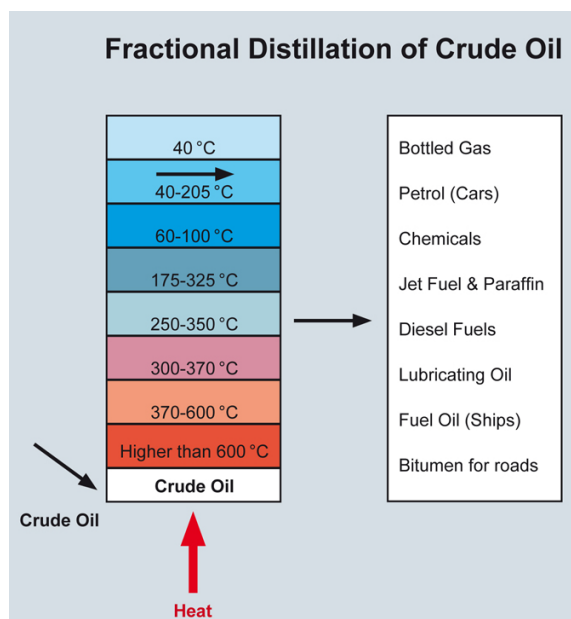
Further examples:
- The separation of raw milk:
  cream has a lower density than milk and therefore floats on the milk.
- Gold panning:
  In a gold pan, gold (density 19.3 g/cm^3) remains, but gravel (density of about 3 g/cm^3) is washed away.
- Stains in clothing:
  A suitable solvent (e.g., white spirit) will dissolve grease on fabric.

In chemical mixtures, we look at different properties such as boiling points, freezing points, densities and solubilities in order to separate the substances from each other.

For example, petroleum is separated into individual fractions (petrol, kerosene, diesel, heavy oil, etc.) by distillation based on the different boiling points of the constituents, which can then be used by different consumers.

When it comes to the recycling of waste, effective methods are sought to extract the valuable substances from the waste in order to reuse the various metals, plastics, glass, etc..
Another major challenge is the collection, separation and reuse of plastic waste in the oceans.

Fractional Distillation of Crude Oil

Temperature	Product
40 °C	Bottled Gas
40-205 °C	Petrol (Cars)
60-100 °C	Chemicals
175-325 °C	Jet Fuel & Paraffin
250-350 °C	Diesel Fuels
300-370 °C	Lubricating Oil
370-600 °C	Fuel Oil (Ships)
Higher than 600 °C	Bitumen for roads
Crude Oil	

Heat

Waste should be collected separately to avoid complex separation processes.
Nothing is waste; everything can be recycled.