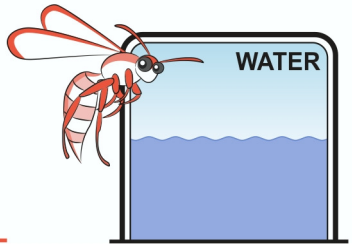


Physical Separation Techniques – Teacher Background

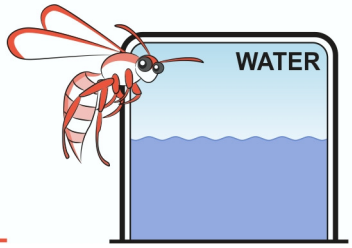
Every 20 seconds a child dies from water related disease

Water is essential for life on Earth. Early life forms absorbed all their nutrients dissolved in seawater. On land essential nutrients move into plant and animal bodies dissolved in water and toxic wastes are removed by water. Too much or too little water causes death.
Water can also carry diseases such as diarrhoea, typhoid and malaria. UNICEF states that only one person in nine has access to clean water. During war, waterborne diseases kill more soldiers than the enemy. To efficiently work with water as a resource from nature, we need to understand what water is and what causes it to behave the way it does. We can then comprehend why rain falls in discrete drops, why the sea has waves, why puddles disappear in sunny days, why we have to wait a long time after rain for the water table to rise and a why a good cotton towel efficiently "mops up" water.

The weir at Mundaring Dam. Perth's water supply

Some History

About 4,000BC, Greek and Sanskrit (Indo Aryan) writings tell of boiling and of filtering water to make it smell and taste better. Hippocrates the father of modern medicine (370BC) invented the Hippocratic sleeve that filtered water through cloth bag because he believed it was healthier for the human body. This is probably the prototype of the "soldier's sock" where soldiers would use sand in a sock to filter larger impurities out of dirty water.
In 1854, British scientist John Snow (famous for using ether & chloroform for anaesthetics) noted that the map of cholera outbreak was centred on a specific well in Broad Street in London. Previously people thought the disease was caused by "miasma" or foul air. The water was being taken from sewage polluted underground sources. When the pump handle was removed deaths stopped.
Suggested background contexts for these activities could include child/community health, the Kokoda Trail conflict, early settlers and life in the Goldfields.



Physical Processes of separation of Mixtures

Mixtures are two or more substances physically combined. They are in the same place at the same time and can be separated using physical processes such as:

Decantation Pouring the liquid away from the solid. E.g. Separating water and marbles by pouring off the water and retaining the marbles.

Filtration Retaining the solid but pouring off the liquid. E.g. Separating peas from water using a sieve.

Evaporation Boiling off the solvent (liquid) to leave the solute (solid) E.g. Drying salty water to keep salt.

Condensation Cooling a gas to form a liquid. E.g. Cooling water vapour (steam) in air to collect water.

Examples would be:

- Peas and water. Water can be decanted from peas.
- Coffee grounds and water. Grounds can be filtered from the mix.
- Water and salt. Water can be boiled from the salt solution to leave solid salt
- Salt water can be boiled and the steam condensed to collect pure water

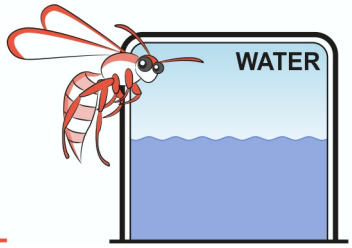
Compounds are two or more substances chemically combined and cannot be separated by physical means. E.g. sodium and chlorine form the compound sodium chloride or common salt.

SOLUTION Vocabulary

Solvent + solute = solution

Solvent Solvents are the liquid in which solids can dissolve. E.g. water dissolves salt and alcohol dissolves grease.

Solute Solutes are solids which dissolve in solvents. E.g. cocoa powder dissolves in milk and instant coffee dissolves in water.



Possible sequence of activities:

Physical Separation Techniques

1. **Decanting**
    - Decanting – Student Activity

2. **Filtering**
    - Filtering With Filter Paper – Teacher Demonstration
    - Filtering With Sand - Student Activity
    - Filtering With A Sari - Student Activity
    - Filtering With Rock - Student Activity
    - Filtering - Vocabulary Worksheet

3. **Evaporating & Condensing**
    - Evaporating & Condensing – Teacher Demonstration

4. **Living Things In Water**
    - Growing Bacterial & Fungal Colonies – Teacher Notes (for student activity)

5. **Revision**
    - Physical Separation Techniques – Student Revision