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| Victorian Curriculum F–10[[1]](#footnote-1) links:  **Science**  **Science Understanding**  **Science as a Human Endeavour**  Scientific understandings, discoveries and inventions are used to inform personal and community decisions and to solve problems that directly affect people’s lives  **Chemical sciences**  Solids, liquids and gases behave in different ways and have observable properties that help to classify them |

**Activity: Sewage: Mainly solid or mainly liquid? (Years 5 and 6)**

From past to present—at the Western Treatment Plant

Students learn that sewage is mostly liquid and model the proportion of solids to liquid in sewage.

### Duration

One hour session

### Equipment

1L soft drink bottle filled with water

1L soft drink bottle filled with half water and half solids (grass clippings, soil and shredded paper)

A range of containers and measuring cups and materials for use as solids such as sand, soil and shredded paper

### Activity steps

1. Show the students the 1 L soft drink bottle filled with water. Explain that the bottle contains 100% water.
2. Show the second 1 L soft drink bottle filled with half water and half solids (grass clippings, soil and shredded paper). Lead students to describe the amount of water as a percentage (50% water).
3. Ask students to stand on a line marked in the classroom to indicate the percentage of water they think makes up sewage. Identify one end as 0% and the other as 100%. Select several students along the line to give a reason for their position on the continuum. Explain that sewage is 99% water and 1% solid. Discuss where the sewage comes from, for example, toilet, showers and baths, laundry, kitchen sinks and industrial waste.
4. Organise students to work in groups of three or four to create a model showing 99% water and 1% solid. Provide access to a range of containers and measuring cups and materials for use as solids such as sand, soil and shredded paper. Students explain their approach to creating an accurate model.

### Teacher background

Sewage typically contains around 99% water. The impurities in sewage are as follows:

* micro-organisms— often including disease-causing organisms (pathogens) such as bacteria, viruses, protozoa and parasitic worms
* phosphorus compounds—these are present in human waste (faeces) and in detergents
* nitrogen compounds—these are mostly present as ammonia or urea
* suspended solids—including inert material such as sand and organic solids such as food scraps
* organic matter—this can include faeces, fats and oils
* additionally, sewage will contain rags, plastics, sanitary products and other large solids.

Waste from industry (trade wastes) can provide high levels of:

* fats and oils particularly from food outlets such as take-away shops, meat and fish shops, cafeterias and restaurants
* heavy metals, toxic materials and various organic compounds (e.g. pesticides and herbicides) from some industries can potentially limit the reuse of sludge (biosolids).

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