Grade 7

Particle theory of matter

Students will learn how scientists separate and purify mixtures by seeing how DNA can be isolated from bacteria and get a greater sense of how small microorganisms and DNA can be.

Activity: Compare size of live cells and bacteria under microscope. Follow along with the step by step process of isolating DNA from transgenic bacteria using micro pipettors and different mixing and separation techniques.

Time required
Half day (2.5h)

The Particle Theory of Matter cluster offers some great opportunities to see techniques that are common to many medical research labs. Not only do we work with solutions and mixtures every day, we also need techniques to separate complex substances. Bacteria are often used to copy DNA, and the isolation and purification of the DNA molecule from these organisms is a key step in many molecular biology labs. This activity draws on many concepts in the Particle Theory unit. Each step is modeled using a visual demonstration to understand what is happening in our test tubes!

Specific learning outcomes addressed 7-1-13; 7-1-14; 7-2-01; 7-2-14; 7-2-18; 7-2-19

Time Required	Student Experience
30 min	Introduction to the Research Centre and research interests, connect Research Centre labs to the use of bacteria and plasmid DNA in health research.
10 min	Break for washrooms or snack
10 min	Use phase contrast microscope to compare the scale of animal cells to bacteria.
10 min	Go over different types of solutions and mixtures in the lab. View demonstration of physical and chemical composition of bacteria carrying plasmid DNA
1h 15 min	Step-wise separation of DNA using mechanical separation, centrifuge, and precipitation. Understand how the DNA preparation process is important in disease research. 5 groups
10 min	Questions and wrap up

times are approximate, we can be flexible however this activity requires at least a full 2 h