

Mass Spectrometry

Educational resource for middle to high school (teachers)

What are atoms and molecules?

- Atoms are the smallest particles which make up everything.
- Molecules are a group of atoms stuck together. They are a little bigger but still very small, way too small to see with your eyes.

Why is MS interesting?

- Mass spectrometry (MS) can tell you all of the molecules that are in something.
- This is really useful because with most other techniques:
 - You can only see a few things at a time
 - And you have to know exactly which molecules you're looking for beforehand.

How does MS work?

- First we have to add charge to all of the molecules. There are a few different ways we can do this.
- Then we can put the molecules through a big machine called a mass spectrometer. It separates them by their mass/charge ratios.
 - It uses magnetic and electrical forces to move the charged particles.
 - When the same force is applied, smaller molecules move faster than bigger ones, if they all have the same amount of charge.
 - We measure how long it takes for each type of molecule to move through the machine, which tells us how big they are.
 - Once we know the size of the molecules, we can figure out what they are.

What is MS used for?

- There are lots of molecules in our bodies, and sometimes they change in disease. So knowing what types of molecules are changing can help us understand what is what happens when people aren't healthy.
- We can also use it to find out what molecules are in many different things, like food and medicine.