**STEM Sims** 

## Name

# - 🔀 🖗 Mass Spectrometry

# **Lesson 2: Practicing Mass Spectrometry**

Mass Spectrometry is a method used to analyze particles from samples to identify what they are and to determine their concentrations. In this lesson, you'll practice the steps required to prepare an unknown sample for testing.

#### **Doing the Science**

- Start the Mass Spectrometry Simulation by clicking on the "Sim" tab. 1.
- 2. Explore the different parts of the mass spectrometer and familiarize how the different parts work by scrolling over the various areas of the machine. Click on each part to learn more about its function.
- Click the "Practice Mode" button. 3.
- 4. Click and drag the 1000  $\mu$ L pipette and release it over the container of 1000  $\mu$ L tips to put a new tip on the pipette.
- 5. Drag the pipette to the container labeled "30% IPA" to fill the pipette with 1000  $\mu$ L of isopropyl alcohol.
- 6. Drag the pipette to the Blank test tube on the top shelf to add 1000  $\mu$ L of 30% IPA to the test tube.
- 7. Repeat steps 5 and 6 for the three remaining test tubes (Calibrator, QC and Patient).
- Dispose of the tip by releasing the pipette over the trash bin. 8.
- 9. Replace the pipette on its stand.
- Select the 100 µL pipette and put on a new tip by dragging and releasing it over the 10. container labeled "100 µL tips."
- 11. Add 100  $\mu$ L of Internal Standard to each test tube the same way that you added the 30% IPA.
- 12. Dispose of the pipette tip and replace the pipette on its stand.
- Place the Blank test tube on the Vortex machine and add 20 seconds to the timer, then 13. press "On." Replace the test tube on the shelf and repeat this process for the three remaining test tubes.
- Click on the cup of transfer pipettes to obtain one. Drag and release it above the Blank 14. test tube to obtain some solution, and then drag it to the Blank test tube with the C-18 cartridge on the countertop to add solution to the cartridge. Place the transfer pipette in the trash and select another one.
- 15. Repeat step 14 for the remaining test tubes with C-18 cartridges.
- 16. Put a new tip on the 1000 µL pipette, then add 80/20 Hexane/Ethyl Acetate to each test tube with the cartridge top. Put the pipette tip in the trash and replace the pipette on its stand.

- 17. Click the red "Run Sample" button in the middle of the screen to view your results. Draw a rough sketch of your results below:
- 18.



## **Do You Understand?**

1. What does the prefix "µ" represent?

2. What is the main reason a chemical technician uses a mass spectrometer?

3. Why do you think a new pipette tip is used on the 100  $\mu$ L pipette in Step 10 of the procedure?

4. What is the purpose of the Vortex machine used in step 13?