

INTRO TO SPARKVUE & INVESTIGATING CHANGES IN TEMPERATURE

INQUIRY

What kind of temperature and energy changes can physical changes cause?

MATERIALS

- Device with SPARKvue software (*school laptop or you can download the app on your Chrombook, phone or tablet – not available for person PC or Mac*)
- Temperature sensor
- Bottle of isopropyl alcohol



BACKGROUND

Physical changes can change the temperature of something by changing its thermal energy. You can observe changes in temperature to determine what kind of energy change occurred. When energy is released from a system, the temperature of the system will increase and the change is exothermic. When energy is required for a change to occur, energy will be absorbed by the system and the temperature will drop because of it. This is an endothermic change.

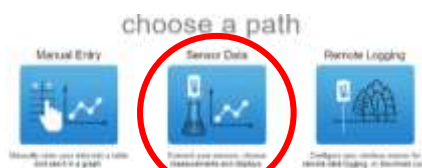
SAFETY

Follow these important safety precautions in addition to your regular classroom procedures:

- Wear safety goggles at all times.

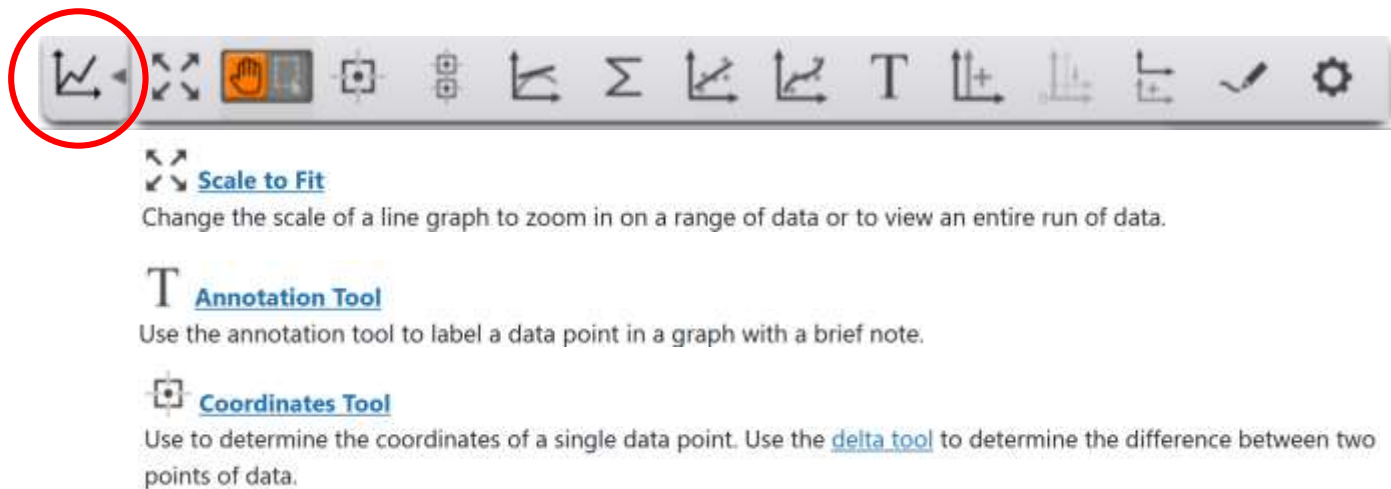
PROCEDURE

1. Turn on the Temperature sensor. Hold the temperature probe by the top – never hold it by the steel probe. This would cause it to measure the temperature of your hands.
 2. Open SPARKvue and choose Sensor Data.
 3. From the list of available devices, select the the ID number that matches your probe. It list. Once it is connected, select Graph from the Templates menu.
 4. When the graph appears, select the y-axis label (Temperature). Select the °C temperature unit from the menu on the right.
 5. The x-axis defaults to time, but double check that this is correct (Time).
 6. Start collecting data. Press the green circle to begin recording the temperature of the air for 5 seconds (don't stop recording!) and then, while continuing to record temperature, hold the temperature probe between your hands and begin to rub your hands together vigorously for 30 seconds or until the temperature levels off, then stop recording.
- **IMPORTANT:** If you have to start over, first, wave the temperature probe around in the air to let it cool down and get back to room temperature before you begin again.



temperature sensor with should be at the top of the

7. If there is time (ask your teacher), have your lab partner(s) repeat step 6. First, wave the temperature probe around in the air to let it cool down and get back to room temperature.
8. Click on the tool bar at the bottom of the graph to open the tools that you will use to label the lines on your graph OR follow more complete instructions on the back page.
 - Label the line(s) with the name of the lab partner who performed the trial.
 - Label the initial temperature and the final temperature reached. (Line should go from a lower temperature to a higher temperature.)



9. Obtain a small bottle of Isopropyl alcohol. Place the temperature probe inside the bottle for a couple of minutes to let the probe acclimate to the temperature of the alcohol.
10. After the temperature probe is acclimated to the temperature of the alcohol, start collecting data. Press the green circle to begin recording the temperature of the alcohol for 5 seconds (don't stop recording!) and then, while continuing to record temperature, remove the temperature probe from the bottle and begin waving it around in the air for 30 seconds or until the temperature levels off, then stop recording.
11. Label the line on your graph, **Evaporation of C₃H₇OH**. Also label the initial temperature and the final temperature reached. (Should go from a higher temperature to a lower temperature.)
12. Change the title of the page from "Untitled" to the last names of each lab partner. You can shorten your last names if they are too long to fit.
13. Take a screen shot of your Sparkvue graph for your lab report. Be sure and get the top of the graph that has your names on it, but don't snip any unnecessary empty space on the sides. (Windows icon+Shift+S)
14. Paste your graph into a Google doc in your Google Drive (both lab partners need to do this!)
15. Put your name heading at the top left of the page and add a title for the assignment (like you do for lab reports).
16. Answer the Analysis questions below under your graph in your Google doc.
17. Save your doc as a PDF and put it into your Chemistry Shared Folder and in TurnItIn.com.



ANALYSIS




1. Was the physical change in step 6 endothermic or exothermic? Explain using quantitative data.
2. Was the physical change in step 10 endothermic or exothermic? Explain using quantitative data.

LABELING YOUR GRAPH

For quick instructions on how to add notes to your graph or to label data points, refer to the instructions below. For full instructions, click on the link here and then select the topic you need from the menu that will come up on the right.




https://www.pasco.com/help/sparkvue/topics/Displaying_and_Analyzing_Data/line_graph.html





The screenshot shows the SparkVue software interface. At the top is a line graph with a green curve. Below the graph is a toolbar with various icons for zooming, panning, and adding notes. To the right of the toolbar is a 'Time (s)' slider. Below the graph area, there are five numbered steps for labeling the graph.



- 1 Select the run you want to analyze in the graph legend. A red border indicates the selected run.

| | Y1 | Y2 |
|---|----|----|
| <input checked="" type="checkbox"/> Run 1 | ↕ | ↕ |
| <input checked="" type="checkbox"/> Run 2 | ↕ | ↕ |
| <input checked="" type="checkbox"/> Run 3 | ↕ | ↕ |

- 2 Click the point you want to add a note to. You can move the tool by dragging the tool or clicking  or .
- 3 Click  to add a note.
- 4 Click the Enter Note field and type your note.

Tip: Click Symbols  or Greek Letters  to enter special characters including subscripts and superscripts.

- 5 Click OK.

If needed, click  to edit the note. To remove the note, click .