Expansion and Contraction lab

1. What is the definition of expansion? What about contraction?

Table 1 Expansion and Contraction of Solids

<table>
<thead>
<tr>
<th>Material</th>
<th>Length at −100°C (cm)</th>
<th>Length at 0°C (cm)</th>
<th>Length at 100°C (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>lead</td>
<td>99.71</td>
<td>100.00</td>
<td>100.29</td>
</tr>
<tr>
<td>steel</td>
<td>99.89</td>
<td>100.00</td>
<td>100.11</td>
</tr>
<tr>
<td>aluminum</td>
<td>99.77</td>
<td>100.00</td>
<td>100.23</td>
</tr>
<tr>
<td>brass</td>
<td>99.81</td>
<td>100.00</td>
<td>100.19</td>
</tr>
<tr>
<td>copper</td>
<td>99.83</td>
<td>100.00</td>
<td>100.17</td>
</tr>
<tr>
<td>glass</td>
<td>99.91</td>
<td>100.00</td>
<td>100.09</td>
</tr>
<tr>
<td>Pyrex™</td>
<td>99.97</td>
<td>100.00</td>
<td>100.03</td>
</tr>
</tbody>
</table>

Stretch and Shrink

Are there similarities in how substances expand when heated? Are there similarities in how they behave when cooled? This activity will help you to identify any patterns.

2. Examine Table 1 above, and use it to answer these questions.
   (a) What similarity do you see in how all the materials react as they warm?
   (b) In what way do the materials react differently as they warm?
   (c) Which material expands the most as it warms?
   (d) Which material expands the least as it warms?

Label this Section of your lab: Shrinky Dinky and record your observations.

Shrinky Dinky Activity –

1. Determine the mass of the shrinky dink: _______ grams. Determine the volume of your material with a ruler and digital calipers (h x w x l): _______ cm³. Take your portion of shrinky dink and color a picture on it. If you want to hang it from a backpack, lunch bag, make it into jewelry, you must place a hole in it now. Don’t punch the hole too close to the edge or it will break through.
2. Dry off your shrinky dink and carefully place it in the oven on top of the foil with the spatula. Be very careful not to burn yourself as you put it in the oven. Keep a close eye on it and watch what happens (use a flashlight if you can’t see). Record your visual observations. After your shrinky dink is done shrinking, use a spatula to remove it from the toaster oven and place it on the cooling tray.
3. Record the new volume: _______ cm³, and measure the mass _______ grams.
4. What has happened to the shrinky dinky? Why do you think it contracted with heat instead of expand? Do most materials do this?
Water Expansion Lab

Day 1
1. Pick out an empty water bottle (take care not to touch the lip of the bottle or drink from it due to it being recycled.
2. What is the mass of the empty bottle? __________grams
3. Using a graduated cylinder or beaker, measure a specific amount of water (50 mL) and carefully pour it into the bottle. Mark the level and write 50 mL. Repeat this process by measuring every 50 mL, adding it to the bottle, and marking the level. Record what the total volume of the water poured into the bottle stopping about 1 inch from the top. Total volume: ________mL
4. With a permanent marker, mark the final level of the water, and then clearly mark your names and class period on the bottle.
5. Put the filled water bottle on the tray so that it can be transported to the freezer.

Day 2
1. Find your water bottle. Make and record observations of the appearance of the bottle now that it’s frozen. Is the water level still even with the mark you made on the bottle yesterday?
2. Record the mass ________grams and estimate how much the volume has increased.
3. You watched a video on why water expands yesterday. Now explain what happened to the water you froze in a paragraph.