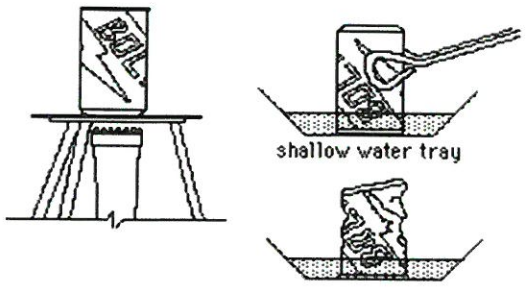
Can Crush Demo

Name: Key Period Date

Thinking and Communicating with Clarity and Precision: When answering this worksheet, please take the following into account: Language and thinking are closely entwined. When you hear fuzzy language, it is a reflection of fuzzy thinking.



Intelligent people strive to communicate accurately in both written and oral form taking care to use precise language...They strive to avoid over generalizations...Instead they support their statements with explanations, comparisons, quantification, and evidence.

Please refrain from using statements like, "Because I said so.", "That's the way it is.", "And, stuff." Do not begin any statement with the word "Because" or the word "It".

Learning Target: *I can explain how temperature affects the motion of air and water molecules*

1. **Why didn't the empty soda can crush before it was heated?**
   Include the following in your answer: temperature, motion of molecules, number of molecules inside vs. outside the can. *(HINT: how fast do the molecules move and how forcefully do they hit each other and the sides of the can)*

The empty soda can didn't crush before it was heated because the temperature, motion of the molecules, and the density (i.e. # of molecules) inside and outside the can were the same because the can was filled with air. Since the can was open to the atmosphere, the air molecules were free to move inside ~~and~~ and outside and vice versa.

2. **What is happening to the water molecules inside the can as it was being heated?**
   (Include the following terms in your answer: temperature, motion of molecules, and number of molecules)

When the can was being heated, the temperature of the water molecules was being increased. The water molecules were going from the liquid phase to the gas phase. The molecules were becoming excited and moving more and faster. The # of molecules (con
in the can

3. **What qualitative observations do you have to support your answer from question number 2?**

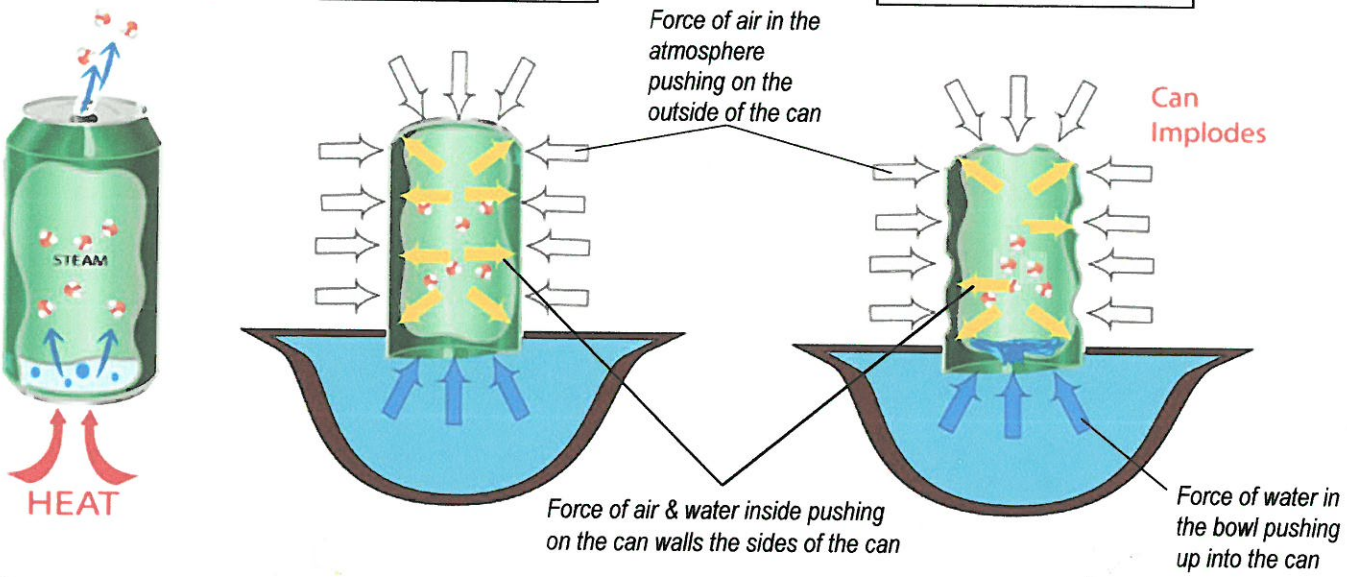
I noticed steam rising out of the can and I heard bubbles hitting on the can. Both of these observations are consistent with boiling (i.e. water going from a liquid to a gas).

Directions for Question #4: Use the diagram on the back of this page, along with everything you have learned about the effect of temperature on the movement of air and water molecules, to help you answer the next question.

1. the water and air inside the can get heated up

2. At first the can and its contents are still hot

3. When the can and its contents cool down, it implodes (crumples)



4. Explain your thinking: Why did the can implode (crumple) when it was placed in the cold water?

(Include the following: temperature, motion of molecules, evaporation, number of molecules, force, & condensation)

The can imploded when it was placed in the cold water because the temperature decreased rapidly, this caused the water molecules which were in the gas phase (i.e. they had evaporated) to condense and become liquid water. The H_2O molecules slowed down and came close together. There were less molecules inside the can than outside of the can. This meant that the pressure outside of the can was greater, causing the can to implode.

Challenge Application Question:

1. You are an auto mechanic working in a garage in the middle of winter. A customer comes back complaining that you did not inspect his car closely enough and believes that the tires are leaking air. Upon questioning the customer, you find out that the customer had to leave the car with the garage for several days, where it was left in a heated bay. The tires appeared fine to the customer when he left, but shortly afterward, the tires appeared to be flatter. You look the tires over and there does not appear to be any holes where air could leak out. Having completed this lab, **what could you tell the customer to put his mind at ease?**

I would tell the customer that his tires were not leaking. The heated air in the bay kept the molecules in the tires in constant motion, causing them to bounce off the tires and keeping them inflated. When the temperature cooled (the car went outside) the molecules didn't move as fast, they didn't push against the tire as much, causing the tires to look flatter (not as inflated).