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6.1.b Student Group Gas Properties Results and Discussion for Experiments A, B and C

Chris Bauer

University of New Hampshire, chris.bauer@unh.edu

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6.1.b Student Group Gas Properties Results and Discussion for Experiments A, B and C

RECORDER REPORT, Chem 444A "Fire & Ice"

Group Member Name Role Date: 10 Feb 2015

Tim Chason : Manager

Calé Frost Recorder

Eliza Sneedem Reflector

Jon Tambusi Spokesperson

-273.15

Samantha

Expt. A

- C. 1. Everyone's data except ours (Samantha, Eliza, Calé) because we did the experiment wrong. Problematic because we didn't depress the syringe + messed up the order of the experiment.
2. Drew a line of best fit + created an equation to show a graphed relationship.
 - a. It corresponds w/ the simulation - shows that as temp increases, so does volume.
 - b. Liquid nitrogen caused volume of balloon to decrease. Volume increased again when taken out of the liquid nitrogen.³ Temp. when gas volume goes to zero: -273.15.

Expt. B

1. solid → gas
2. solid carbon dioxide, doesn't come from a liquid like reg. ice
3. yes, consistent

4. 



Expt. C

1. ~~water~~ water, air, TFE (occasionally sand + salt)



3. Yes. Same/similar results found.
4. air (?), energy(?) heat (?)

RECORDER REPORT, Chem 444A "Fire & Ice"

Group Member Name

Role

Date: 2/10/14

Heather Price Recorder

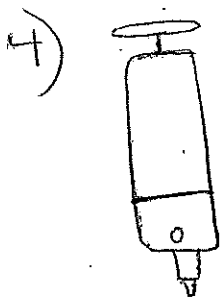
Amanda Jones Reflector

Taylor Witkiewicz Spokesperson

Kaleigh Zukowski Manager

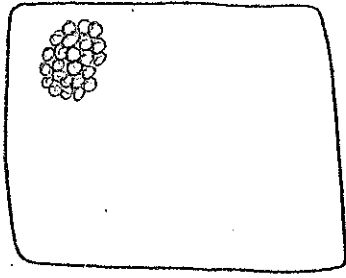
- C.) Expt A:
- 1) most graphs seem to reflect an upward slope except one which shows a more constant slope. This could have been due to human error.
 - 2) He figured out the line of best fit and changed the scales to better illustrate the upward slope.
 - a) Yes, it is consistent with PhET. As temp. increases, volume increases.
 - b) when we stuck objects into liquid nitrogen, it decreased its temperature, thus decreasing its gas volume (the balloon). It expanded instantly when returned to room temperature.
 - 3) $y = 0.0474x + 18.785$
 $0 = 0.0474x + 18.785 \Rightarrow x = -396.308$

- Expt B:
- 1) Sublimation is when an element goes from solid to gas without going through the liquid phase.
 - 2) It's called dry ice because we don't see it in the liquid phase. It doesn't melt into a puddle. It is solid CO_2 .
 - 3) our data is very close the average, but nowhere near the theory.

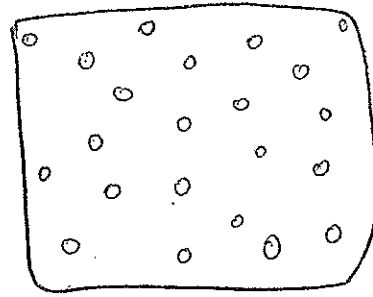


5)

Before



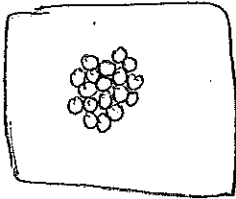
After



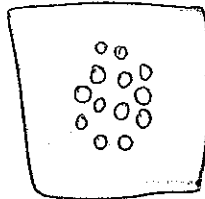
spt. C: 1) ~~compressible, water, TFE, and air~~ compressible.

Water, TFE, and air were

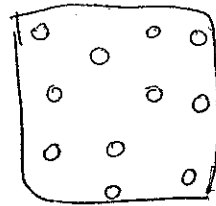
2) Solid



Liquid



Gas



when the molecules are close together, it's more difficult to compress because there's less space ~~in between~~ for them to move.

3) Our diagrams are the same in terms of space between the molecules.

4) Molecules move freely in the gas phase because there is space between them.

Questions:

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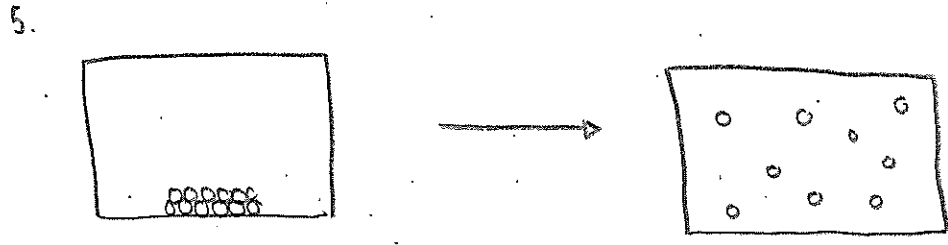
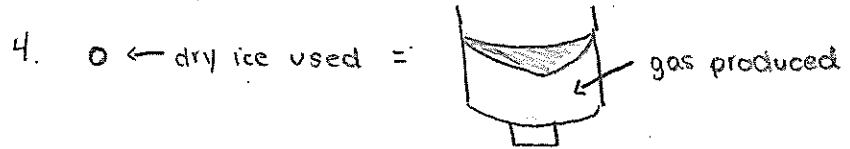
Group Member Name	Role	Date: <u>1/10/14</u>
<u>Emma</u>	<u>Manager</u>	
<u>Jake</u>	<u>Recorder</u>	
<u>Marisa</u>	<u>Spokesperson</u>	
<u>Miriam</u>	<u>Reflector</u>	

- xpt A:
- All data, but one showed a positive relationship between volume and temperature. The one inconsistent group may have just not closed the valve, causing pressure to not remain constant.
 - On the reverse, CB took the last three data points and created a line of best fit for them. The relationship is consistent with simulation play when pressure is kept constant. It is also consistent with the deflation of a balloon upon contact with freezing liquid nitrogen.
 - $$y = 0.0453x + 15.285$$

$$(0) = 0.0453x + 15.285$$

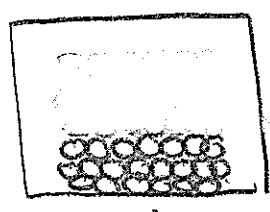
$$x = \boxed{-337.4^{\circ}\text{C}}$$

- xpt B:
- sublimation is when something goes directly from solid to gas
 - Dry ice is solid carbon dioxide. It's "dry" because though it looks like ice, it doesn't melt into a liquid but rather sublimates.
 - Yes they are all consistent.

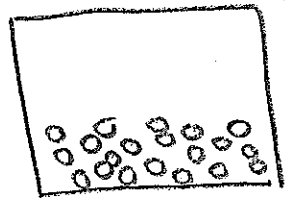


Expt C : 1. gasses were most compressable

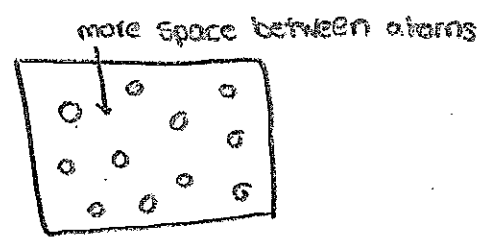
2.



solid



liquid



gas

3. Yes. Gaseous molecules take up more space than solid molecules

4. Empty space

RECORDER REPORT, Chem 444A "Fire & Ice"

Group Member Name

Role

Date: 2/10/15

Emily D

Reflector

Charles C

Recorder

Kyle R

Manager

Mandy G

Spokesperson



XPTA

- C1) There seems to be an upward trend, with the exception to graph 3 - Samantha and Eliza. Perhaps the plunger was not closed.
- C2) He made a linear regression and also eliminated graph 3 as stated above. He came up with an equation for each line. This behavior is consistent with the simulation results. The liquid nitrogen was becoming a gas, hissing, beeping up when it came into contact with surfaces like the table. Left off the negative temperature data.
- C3) For Emily D and Amanda G's graph, the temperature when the gas volume goes to zero is -154.42°C .

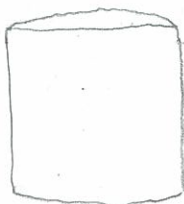
EXPT B

- 1) Sublimation is when a solid goes directly to a gas
- 2) Dry ice is solid CO_2 . Since it goes through sublimation, it is "dry", whereas ice would melt and then evaporate.
- 3) Our results, KR CC, are fairly consistent with the class data. However, they are pretty low. That could be a result of the size of the piece and the amount it sublimated before weighing, a loose syringe, or the time the gas level was read.

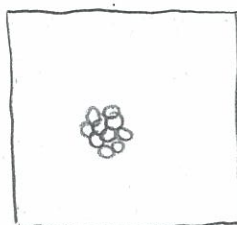
4) DRY ICE

○

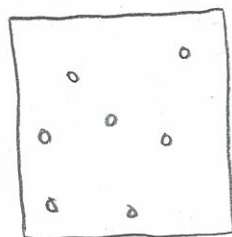
VOLUME



5) BEFORE



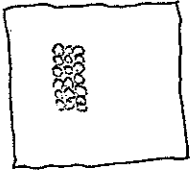
AFTER



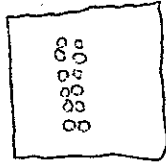
EXPT C

1) Gases

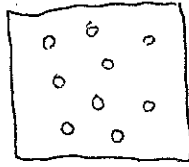
2) SOLID



LIQUID



GAS



3) Yes, the solid and gas pictures show a similar idea in both experiments. Dense states have compact molecules, while gaseous spreads out.

4) Empty space...

RECORDER REPORT, Chem 444A "Fire & Ice"

Group Member Name

Role

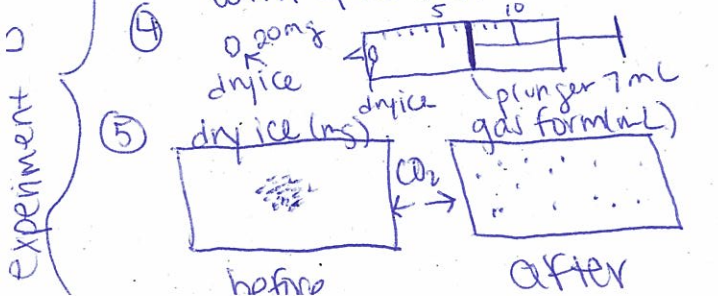
Date: 2/10/15

<u>Nick</u>	<u>manager</u>
<u>Becky</u>	<u>recorder</u>
<u>Emily</u>	<u>Spokes person</u>
<u>Sean</u>	<u>reflector</u>

① The graphs that show an upward or positive curve seem to look accurate. Samantha and Eliza's graph does not look accurate, as it does not show the same upward slope. The inaccuracy could be due to temperature differences, the order of steps for each experiment, the variation in how procedure was performed.

② The professor took the datapoints + graphed them. He also threw out the outliers, having only 3 points per graph. He also included the equation at the top of each graph. The line he has drawn represents a line of best fit, reflecting the average of the volume of gas + relationship with temperature. The behavior is consistent with simulation results because we found that as gas volume ↑ temp ↑ which is what is depicted in the graph. ⑤ The liquid nitrogen experiment is consistent with our experiment results. For example, when the balloon was exposed to liquid nitrogen, the balloon shrank + got cooler, indicating a ↓ in gas is correlated to ↓ in temp.

- ③ temp -440.5°C when gas volume goes to 0.
- ① going from a solid to a gas
 - ② dry ice is CO₂. it is called dry ice because it is cold like ice, but it never goes to liquid phase, it goes straight to gas.
 - ③ It appears that our results seem to be relatively consistent with the rest of the classes.



experiment 1

experiment 2

experiment 1 gases, water, and air bubbles



↳ but it was still compressible, it just went back to original mL after you release plunger.

This shows the change in the spacing of the molecules.

- ③ We feel that our results are ~~consisting~~ consistent with the solids + gas. However, ~~because~~ we could ~~not actually~~ compress the water due to the air bubbles.
- ④ our results are not what we discovered today since the liquid went back to the original mL. Empty space?