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Day 06 Feb 10 Gas properties and laws.
Historical ideas about heat.

Fire and Ice

2016

6.0.A Daily Outline

Christopher F. Bauer

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

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Purpose:

Continue building understanding of particulate nature of matter and how heat and temp fit with that

- Review and debrief results of experiments last class (point out experimental weaknesses)
 - Compressibility
 - Density of solid vs gas
 - V vs T relationship and absolute zero
- Link with liquid nitrogen properties, and with simulation
- Reinforce idea of absolute zero and the K scale
- Critique experimental results and decisions

Discuss readings that relate to the nature of heat (a substance or not) and attempt link to particulate model and KMT behavior.

Address some extensions and applications – deflate gate, planetary atmospheres

Board

Make a stick-on name tag with first name

Find your partner from Tuesday – and the other pair – sit together

Pick up your experiment notes

Folders at tables contain expt results

I'll come around to check your notes and check you in

Materials

Name tags

Premade name cards

White board markers

Returns

- Recorder reports from the working pairs from Tuesday about simulation work
- Recorder reports from pairs working on experiments Thursday

Distributions

- Thursday class experiment results

Starting Comments _____ 2 minutes max

- Pictures posted on BB
- Group assessments of posters – thoughtful comments

Task 1 Review experimental work from Thursday

Handout provides organizational and question guidance. **FOLDER: Instructions and 2 data sheets for all.**

Reflector's will have something to do: While participating, make note of who is doing the most talking, and the least. Identify the reflector and give them their assignment privately.

Reflector: You should participate in the discussion. But you should also simply make note of how many times each individual, including yourself, contributes something to the discussion.

After Task 1 has been completed, you will be asked to report to your group on your observations. You are not making a judgment of good/bad. You are simply reporting what you saw.

Interns should be involved in monitoring for progress on Task 1. – Join 3 groups NOT on camera at Task 1C, sit with group; be a Socratic resource; for you: are they getting it? Your evidence?

Get into: DID NOT GET TO THIS

- What is pressure, in particulate model? Wall collisions per sec per unit area
- What is K scale? How related to C scale? Size of a K step or a degree C

REFLECTORS: Describe to group what you were doing. Report your results.

GROUPS: Discuss what you might decide to do about what was observed in order to improve the group's function.

I asked whether this was easy or hard to do. Not much comment.

Task 2 Discussion of Readings **INTERNS: just listen. Help hone observations.**

Let discussion run. Debrief stepwise. Allowing group to express it's results. Looking for confirmation or questions from other groups.

Hauksbee talks about there being something elastic in the material that allows for compression and expansion. Without really determining what that substance might be.

Does any propose that energy absorption increases the particle motion in solids or liquids, thus expanding volume a bit? Don't push it unless they suggest it.

Rumsford:

Mass does not change on heating or cooling: i.e. heat is not a substance, or it has little to no mass.

No suggestion about "a fluid"

Systematic controlled experiments. Careful control of potentially confounding factors.

Fun facts: go around table by table -- **they weren't very engaged with this**

Task 3 Challenge Questions that were provided

- Deflate gate; components of air; planetary atmosphere -- who took on which one

Challenge Questions (attempt without consulting other sources of info):

- 1) Things we did apply to the deflate-gate controversy. What and explain how it applies? Does this confirm or dispute the claim that the Patriots let air out of the balls?
- 2) What are the major components of air? Predict (graph) their relative average speeds. (dinitrogen, dioxygen, carbon dioxide, water, argon) – how to calculate mass of a substance
- 3) Apply any relationship we've discussed to explaining why the inner planets are devoid of H₂ and He, whereas the outer planets are rich in them. [name the inner and outer planets]
You can use the PhET to test this.

Again: ran out of time

Consider organizing into groups by primary question.

Consider joining the components of air people and the planetary people in the same group.

Goal: Compare your answers. Come to an agreement. Organize your argument. Prepare someone to speak for the group to make the argument.

Listen to the arguments. I will ask each other group to ask a question or challenge a statement.

Homework for Thursday: PhET "State of Matter – Basic" Turn on Phase Diagram while you play.

I sent guidance.

Intern Activities, Day 6, Feb 10 Fire & Ice

Sara was missing because of travel issues with snow. [Univ was closed Monday]

Pick one of the groups (not the corner ones who are on close cameras).

Sit with them. Introduce yourselves.

Be a resource, but don't offer explanations. Just help them talk about their information. They were reviewing the ABC experiment data (Charles Law, compressibility, dry ice expansion).