Welcome to Jeff's CHEM 4 lecture!

We'll be starting in just a bit...

While you are waiting:

- 1) Bookmark our website: <u>tinyurl.com/SacStateChem4</u>
- 2) Go to <u>LearningCatalytics.com</u> to prepare for today's clicker questions. Login with your MasteringChemistry login.
- 3) Turn off your camera and microphone. We'll use the chat feature to ask questions.
- 4) Being a professor is my dream job. It's challenging, rewarding, and I also get to meet all of you! *What's your dream job?* Share in the Chat.

Where you should be now...

- Explored our website: <u>tinyurl.com/SacStateChem4</u>
- Check our August/September calendar for daily assignments
- ✓ Read over the syllabus
- ✓ Joined optional PAL
- ✓ Review PowerPoint slides
- Registered MasteringChemistry
 - ✓ Completed Assignment #0
 - ✓ Located the e-text
 - ✓ Read 3.1 3.6, 4.1 4.2
 - ✓ Download "Pearson eText mobile app"
- X Commit to Study = nothing to do yet



CHEM 4 lecture

Wednesday – September 2, 2020

Sec 3.1-3.6, 4.1-4.2

Matter and atoms

Clicker question: Go to <u>LearningCatalytics.com</u> and login with your MasteringChemistry login.

- 1) Based on your assigned reading (Sec 3.1-3.6, 4.1-4.2) for today which of the following statements is false?
 - A) In amorphous solids, the atoms/molecules do not have long-range order.
 - B) Liquids have indefinite shape and definite volume.
 - C) Homogeneous mixtures have the same composition throughout.
 - D) Compounds are substances composed of two or more elements in fixed proportions.
 - E) Chemical properties are those that a substance displays without changing its composition.
 - F) Melting is an example of a physical change since the process results in a new form of the same substance.

Background: Using Concept Maps to Learn Chemistry

- Concept maps can help us learn chemistry because they model the way that the brain stores information in connected chunks.
- Method: Identify key concepts and show how they are connected using labeled arrows.
- Example: "Chemistry is the study of matter. Matter is anything that has mass and volume."



Clicker question: Matter

- 2) Which of the following is not an example of matter?
 - A) A book
 B) Water
 C) Air
 D) Love
 E) A rock
 F) People



Background: Using Concept Maps to Learn Chemistry



Background: Classifying matter by categories

- So if almost everything is "matter", how can we begin to make sense of it all?
- As with biologists who classify living organisms (prokaryotic, eukaryotic, unicelluarl, multicellular...) and geologists who classify rocks (metamorphic, igneous, sedimentary...), chemists have various ways of classifying matter.

• Classifications are very useful... once you know a sample of matter is, for example, a liquid or a homogenous mixture, you automatically know certain things about it.

Background: Classifying matter as a pure substance or a mixture (figure 3.8)



Background: Classifying matter as solids, liquids, or gases (figure 3.4)

Once you know a sample of matter is, for example a gas, you automatically know certain things about it. You know that it is compressible and that it takes the shape and volume of its container.



Background: Other states of matter



Background: Other states of matter, Non-Newtonian fluids



Background: Other states of matter, Non-Newtonian fluids



Background: Other states of matter, Non-Newtonian fluids

Oobleck ingredients:

- 2 cups of cornstarch
- 1 cup of water
- Food coloring (optional)

Directions:

- If you want to add food coloring, add a few drops to the water.
- Stir the water into the cornstarch.
- Mix it all together and that is it!



- Touch it, squeeze it, try to cut it... Applying pressure will make the Oobleck harden into a solid but once you stop moving, it becomes a liquid.
- So it is a solid or a liquid? It's neither, it's a non-Newtonian fluid.

Background: Classifying matter by its chemical and physical properties

Two kinds of properties:

- Chemical properties: Measuring the property has the potential to result in new substances.
- **Physical properties:** Measuring the property does NOT have the potential to result in a new substance.
- How to tell the difference? Imagine examining a sample of matter to measure the given property...
 - If the act of measuring that property can create a new substance, then that property is a chemical property.
 - If the act of measuring that property can not create a new substance, then that property is a physical property.

Clicker question: Chemical and physical properties

- 3) One of the primary contributors to global climate change is the generation of the green-house gas, carbon dioxide by humans. Which of the following is a chemical property related to carbon dioxide?
- A) The current concentration of carbon dioxide in Earth's atmosphere is 404 ppm (parts per million).
- B) At most pressures, carbon dioxide sublimes (turns from solid directly to gas) rather than melts.
- C) Carbon dioxide reacts with water to form carbonic acid.
- D) Carbon dioxide is a gas at room temperature and standard atmospheric pressure.
- E) At low concentrations, carbon dioxide is odorless.
- F) The density of carbon dioxide is 1.98 kg/m³ at room temperature and standard atmospheric pressure.