Unit 8 NAME

Class Work 3/29/14

8.11 Ideal Gas/Kinetic Molecular Theory

SPARK (take out 8.10 WS)

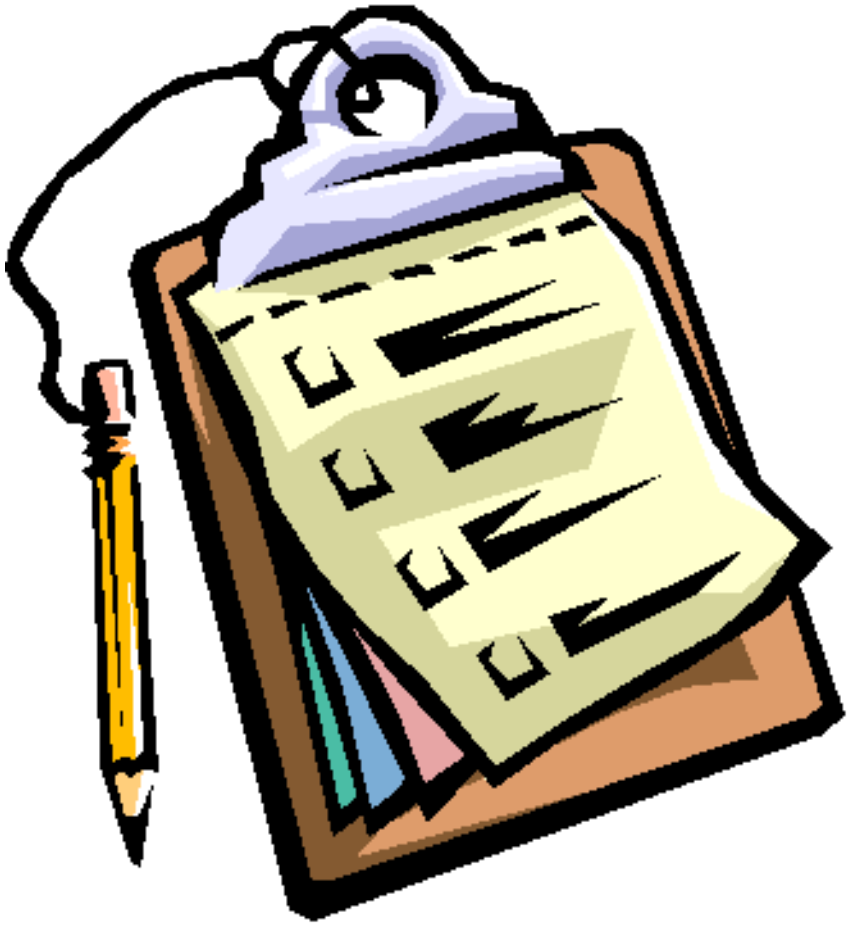
1. When you heat a marshmallow in the microwave, the marshmallow expands. What is the relationship between temperature and volume?
2. What is average kinetic energy?

Objective

SWBAT use the combined gas law and Table H

Agenda:

- SPARK/Objective
- Notes
- Practice
- Homework



Objective: SWBAT use the combined gas law and Table H

Questions

- Any questions on 8.10 HW?

Objective: SWBAT use the combined gas law and Table H

Combined Gas Law

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$$

**If something is constant, you can cross it out!

Objective: SWBAT use the combined gas law and Table H

- How are temperature, volume and pressure of a gas related?

Objective: SWBAT use the combined gas law and Table H

Now let's think about…

VAPOR PRESSURE

Objective: SWBAT use the combined gas law and Table H

Case Study

Danielle recently moved to Denver, CO from New York City. She decided to make some pasta for dinner and used her favorite recipe from back home. She put the pasta in once the water was boiling and cooked it for about 12 minutes like she has always done before. However, after 12 minutes, her pasta was still very undercooked so she ended up cooking her pasta for nearly 20 minutes before it was ready.

Objective: SWBAT use the combined gas law and Table H

Review of Phase Equilibrium

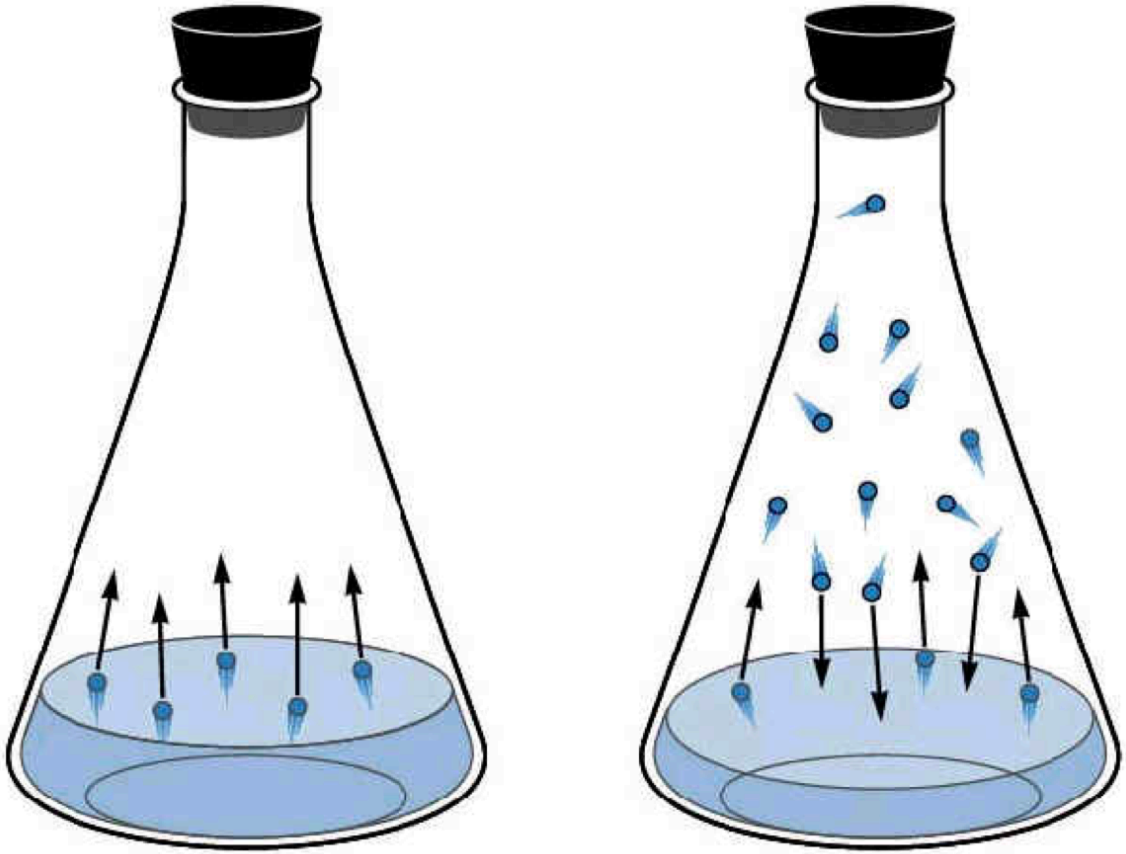
- At equilibrium:
  - Rate of the forward and reverse reactions are equal
  - Concentrations of the product and react are constant

Liquid  Gas

Evaporation and Condensation are occurring at the same rate in a CLOSED SYSTEM

Objective: SWBAT use the combined gas law and Table H

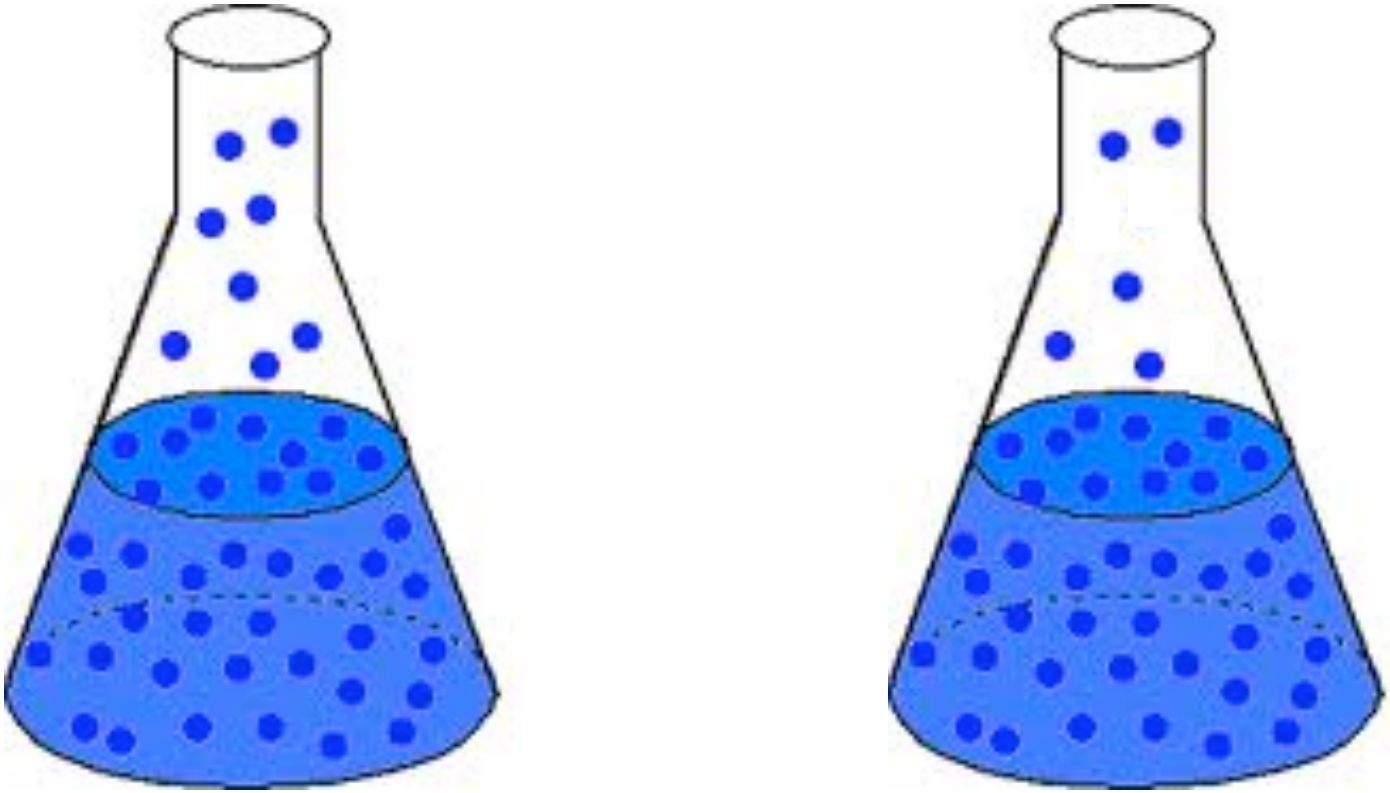
What is vapor pressure?



When a system is in phase equilibrium, the particles in the gas phase collide with the surface of the container. ***This is pressure.***

Objective: SWBAT use the combined gas law and Table H

Which one has lower vapor pressure?



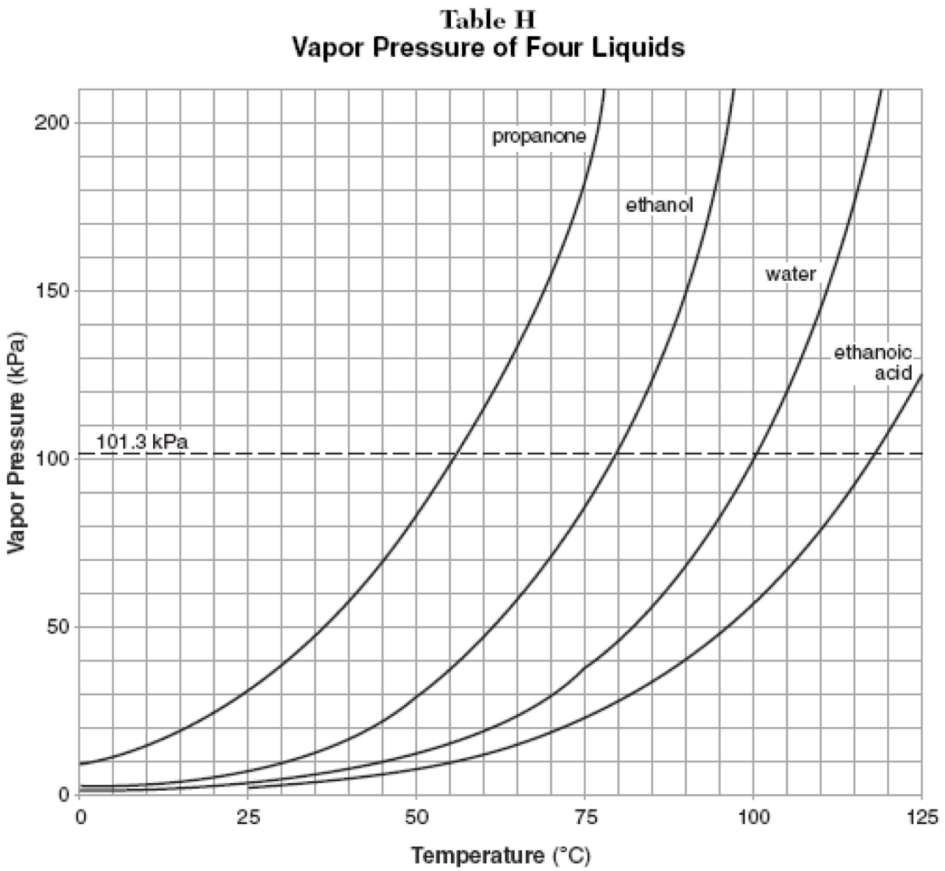
Objective: SWBAT use the combined gas law and Table H

So what is boiling, really?

- A substance boils when the atmospheric pressure (the pressure that the air exerts on a surface) EQUALS THE VAPOR PRESSURE OF THE LIQUID
- Atmospheric pressure is 101.3 kPa (kilopascals)
- The temperature at which the atmosphere pressure = the vapor pressure is the boiling point of a substance

Objective: SWBAT use the combined gas law and Table H

The boiling point of a substance can be found using vapor pressure



Quick check:

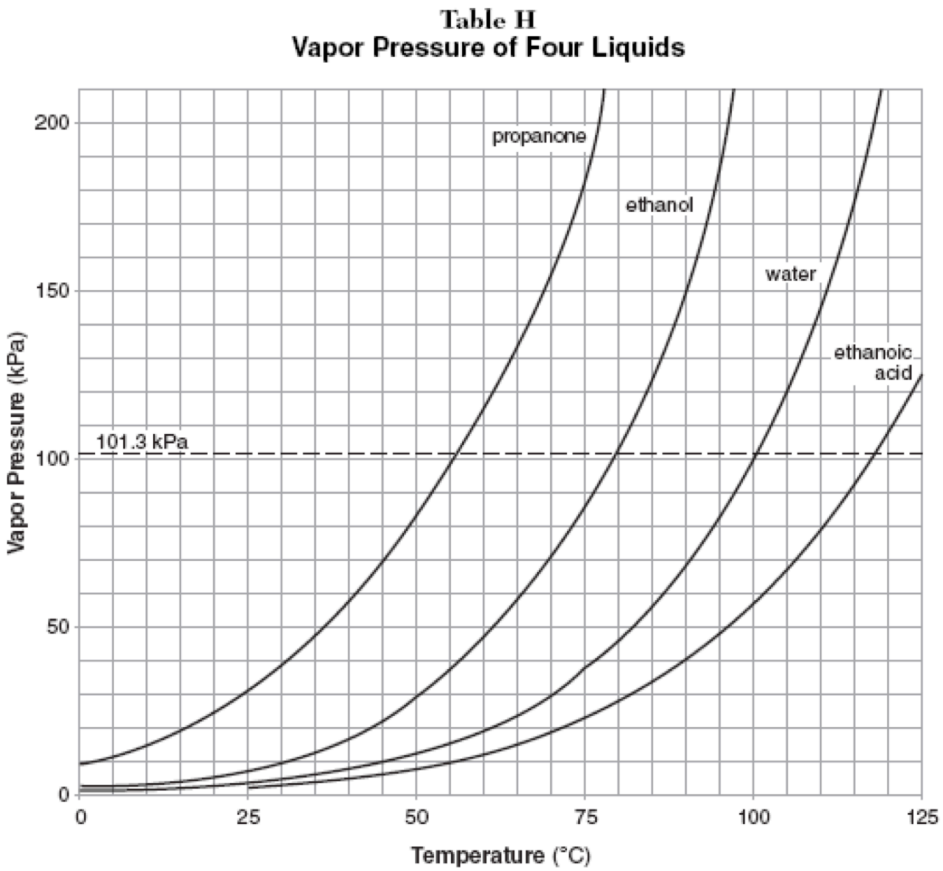
1.What is the boiling point of ethanoic acid at standard pressure?

2.If the pressure of the atmosphere was 50 kPa, what would the boiling point of ethanol be?

3.At what temperature does propanone have a pressure of 70 kPa?

Objective: SWBAT use the combined gas law and Table H

The boiling point of a substance can be found using vapor pressure



Quick check:

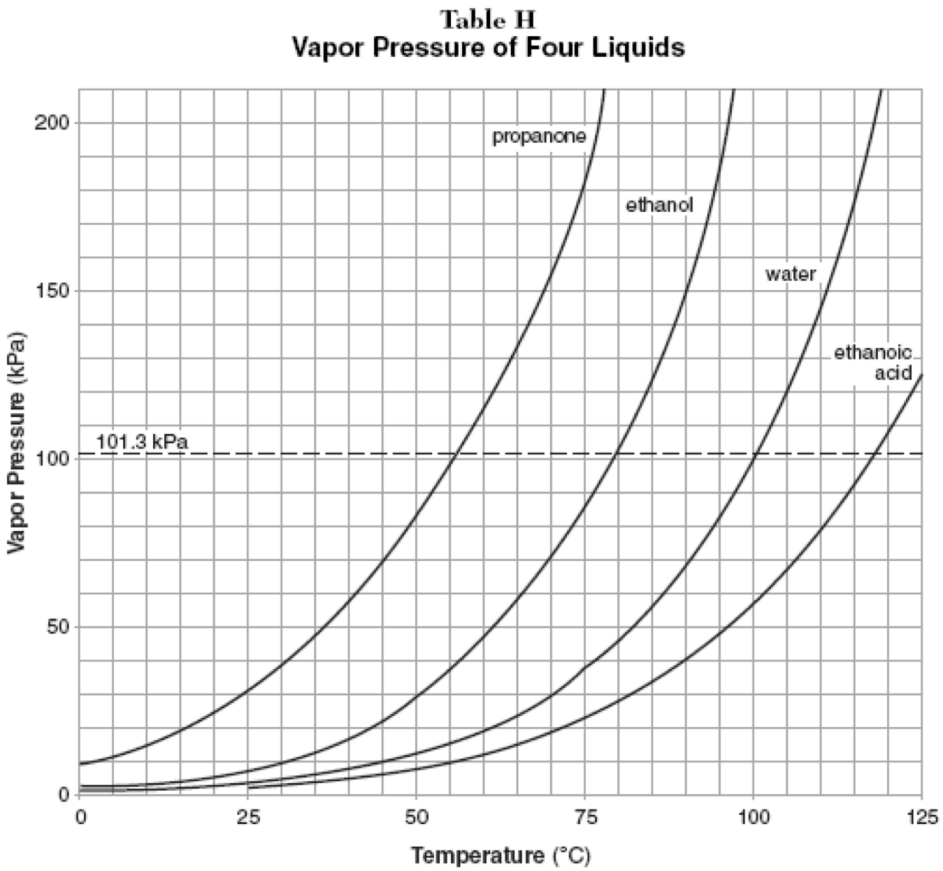
1.What is the boiling point of ethanoic acid at standard pressure? 118 °C

2.If the pressure of the atmosphere was 50 kPa, what would the boiling point of ethanol be?

3.At what temperature does propanone have a pressure of 70 kPa?

Objective: SWBAT use the combined gas law and Table H

The boiling point of a substance can be found using vapor pressure



Quick check:

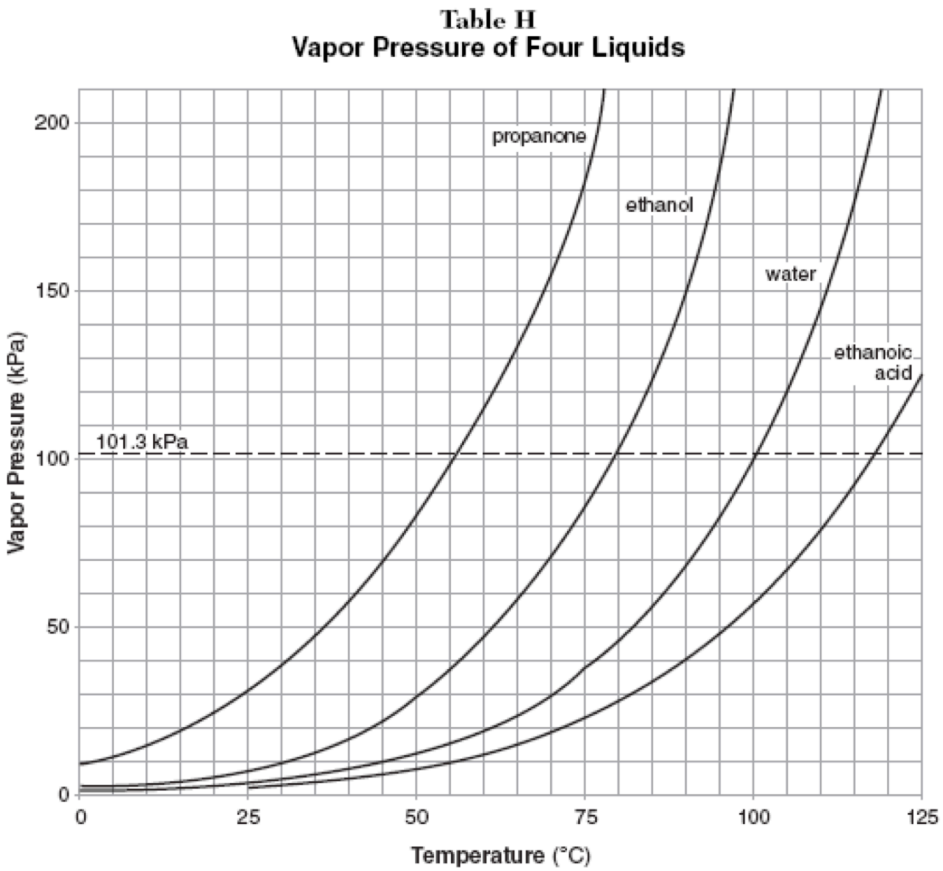
1.What is the boiling point of ethanoic acid at standard pressure? 118 °C

2.If the pressure of the atmosphere was 50 kPa, what would the boiling point of ethanol be? 62 °C

3.At what temperature does propanone have a pressure of 70 kPa?

Objective: SWBAT use the combined gas law and Table H

The boiling point of a substance can be found using vapor pressure



Quick check:

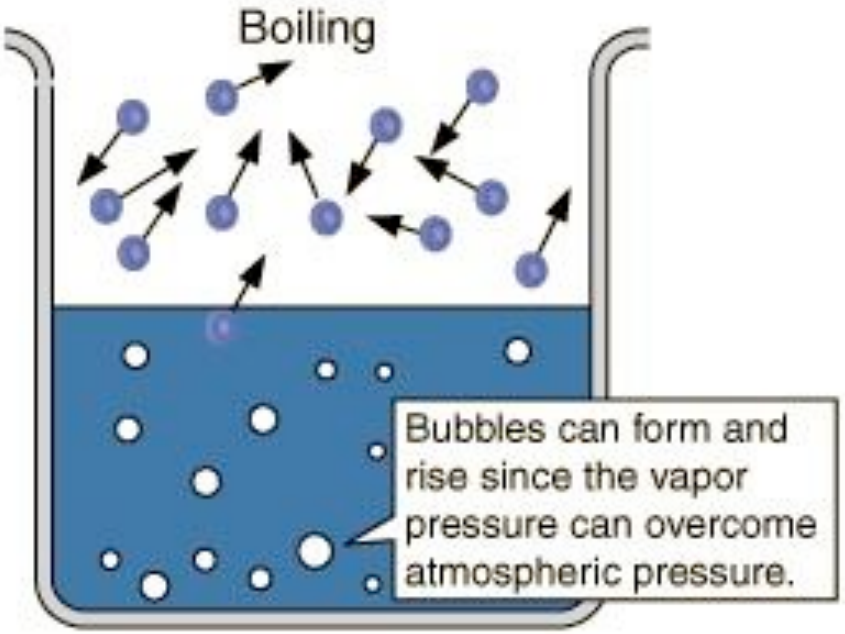
1.What is the boiling point of ethanoic acid at standard pressure? 118 °C

2.If the pressure of the atmosphere was 50 kPa, what would the boiling point of ethanol be? 62 °C

3.At what temperature does propanone have a pressure of 70 kPa? 45 °C

Objective: SWBAT use the combined gas law and Table H

So what does this mean?



Objective: SWBAT use the combined gas law and Table H

In terms of vapor pressure, why does heating a substance cause it to boil?

Objective: SWBAT use the combined gas law and Table H

How can we actually cause a substance to boil at room temperature?

Objective: SWBAT use the combined gas law and Table H

Case Study Directions

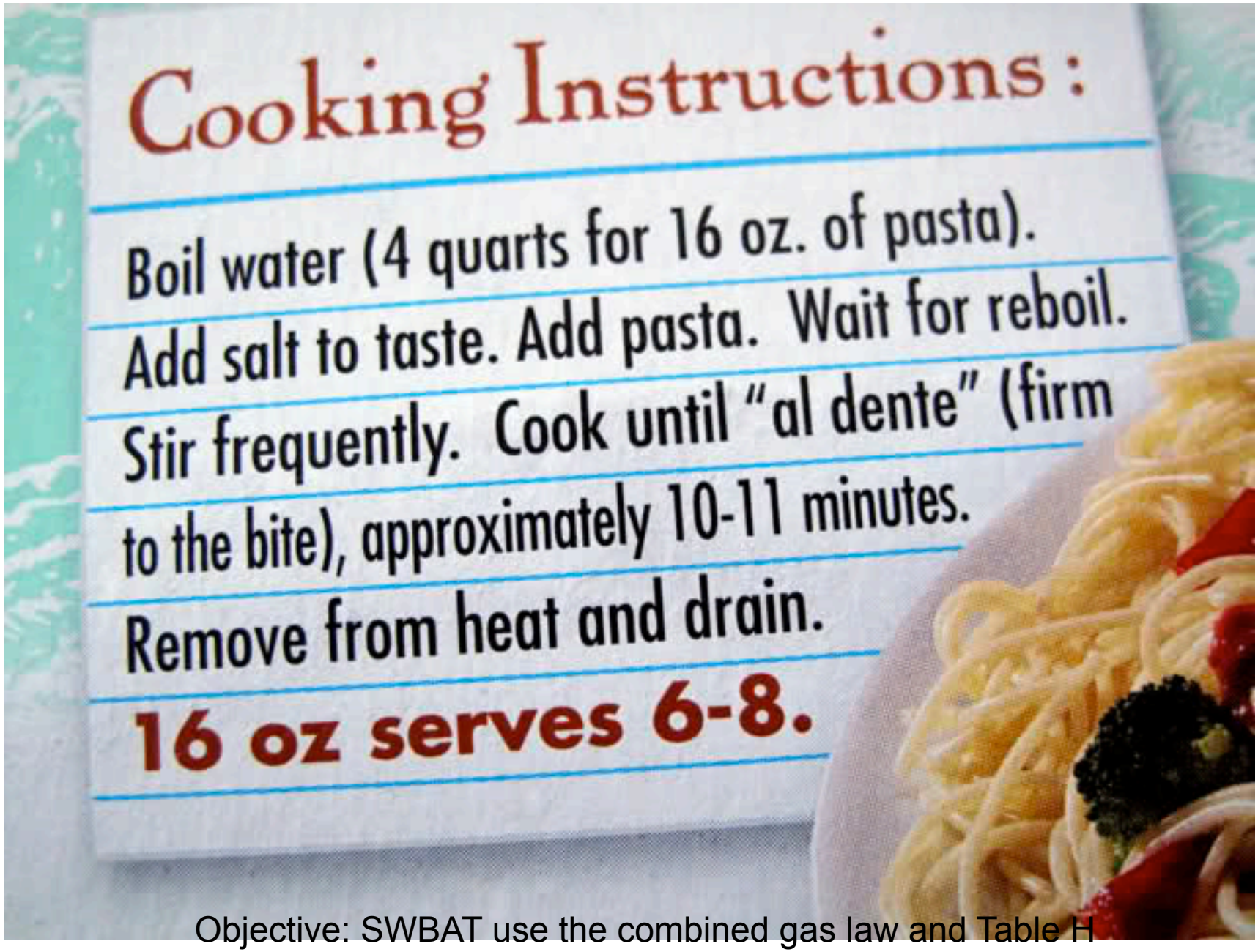
- In your table groups, look at the artifacts and evidence that will help you come to an understanding as to what happened to Danielle's pasta. You have 3 minutes to discuss and come up with a theory.

Objective: SWBAT use the combined gas law and Table H

Back to our case study!

- Danielle recently moved to Denver, CO from New York City. She decided to make some pasta for dinner and used her favorite recipe from back home. She put the pasta in once the water was boiling and cooked it for about 12 minutes like she has always done before. However, after 12 minutes, her pasta was still very undercooked so she ended up cooking her pasta for nearly 20 minutes before it was ready.

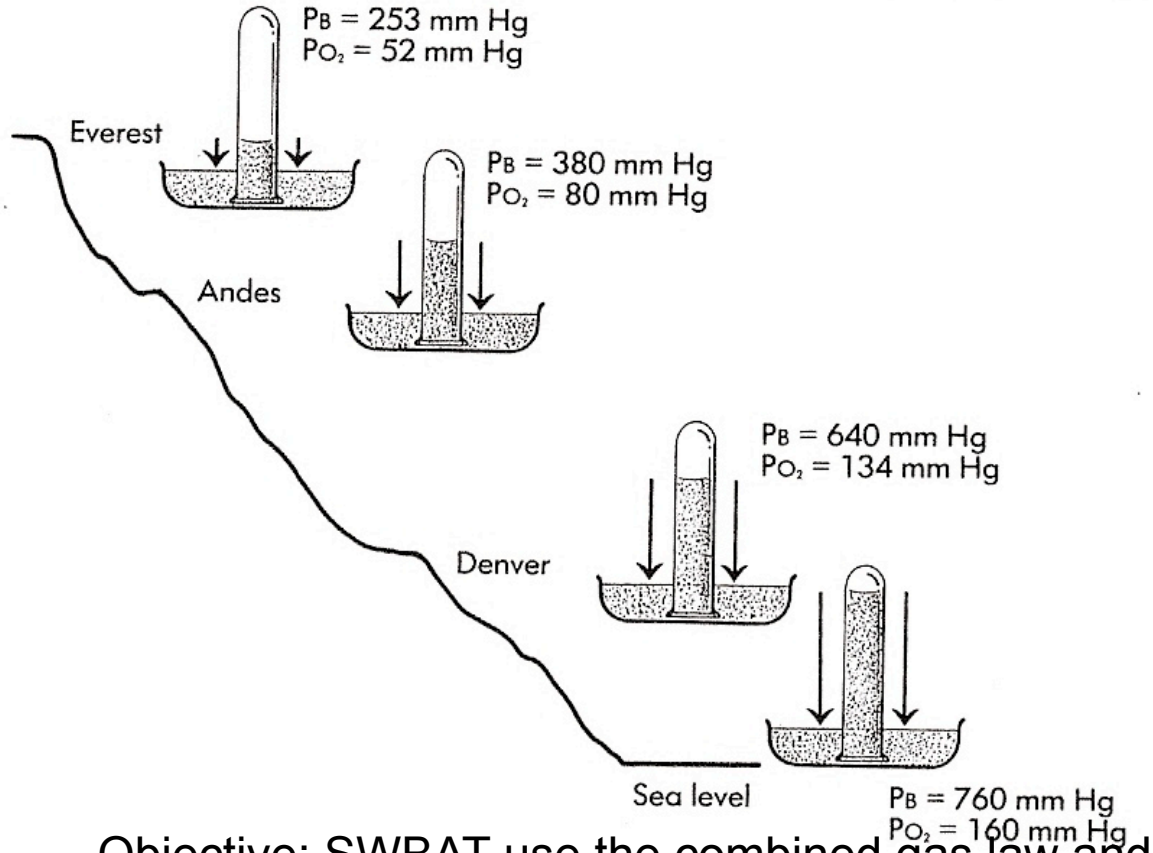
Objective: SWBAT use the combined gas law and Table H



Objective: SWBAT use the combined gas law and Table H

Air Pressure

- Note 1 kPa = 7.5 mmHg



Objective: SWBAT use the combined gas law and Table H

Recommendations from Betty Crocker

Cooked Food	Possible Problems	Adjustments to Try
Soups, Stews & Sauces	• May take longer to cook • Liquid may evaporate faster	• Add water to achieve desired consistency (for sauces, start with 1 to 2 Tbsp; for soups and stews, amount needed could be up to 1 cup)

Objective: SWBAT use the combined gas law and Table H

For your edification
Case #2: The fat bag of chips

Krystal bought a bag of chips before getting on the plane to go to Aruba. On the plane, she noticed that her bag of chips looked like this:

Why did this happen?

Objective: SWBAT use the combined gas law and Table H

Closing Points

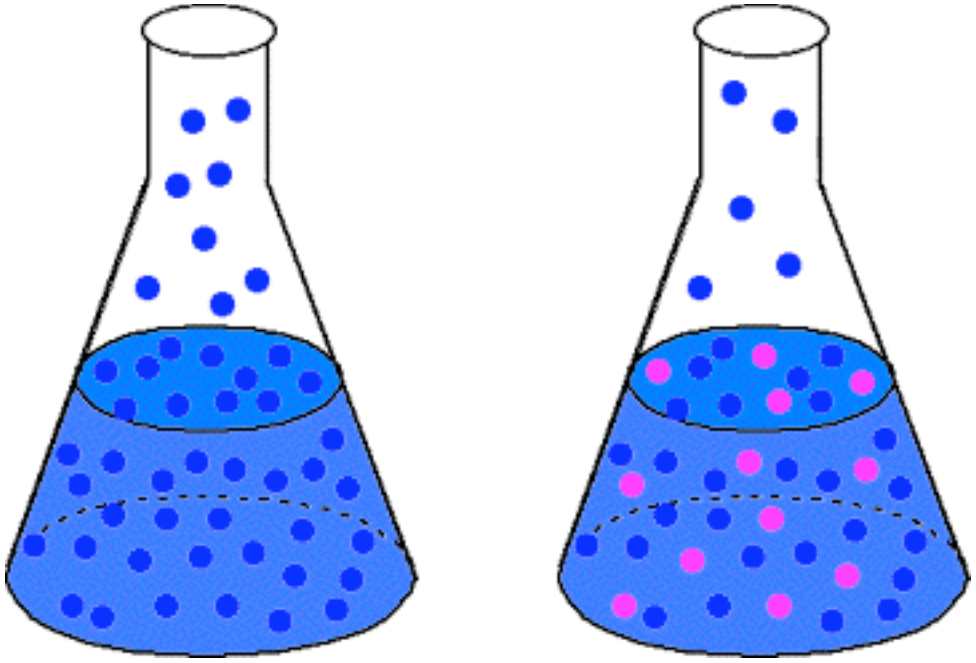
- The vapor pressure is the force exerted by the vapor particles that exist above a liquid substance
- When the vapor pressure of a substance equals the atmospheric pressure (force exerted by the air particles in the atmosphere), then boiling occurs

Objective: SWBAT use the combined gas law and Table H

8.11 Classwork!

Objective: SWBAT use the combined gas law and Table H

Critical thinking for HW: Is vapor pressure a colligative property?



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HOMEWORK

Finish 8.11 Classwork/Homework