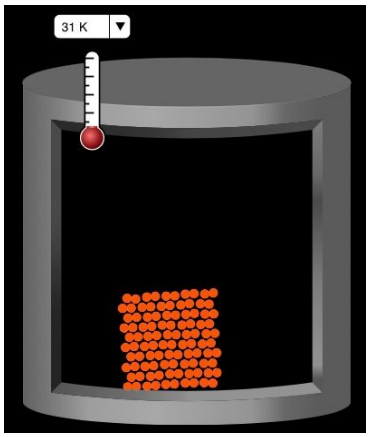
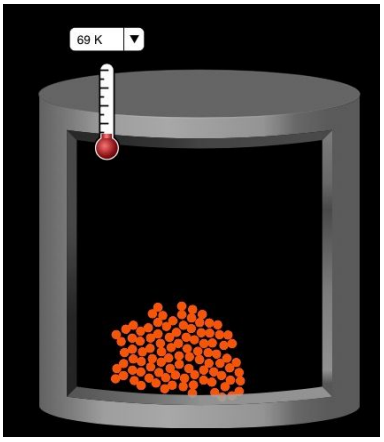
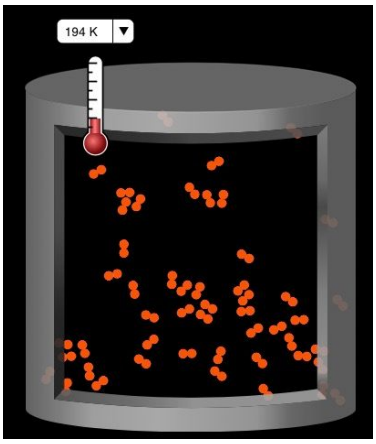
Chemistry 20	Unit 2
Lesson 7 - Introduction to Ideal and Kinetic Theory	84 mins

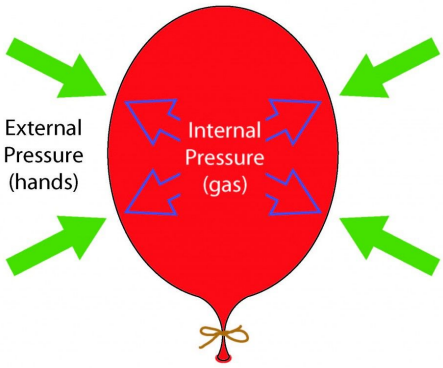
Kinetic Molecular Theory (KMT)

- Everything is molecules
- Molecules are always moving
- There are forces of attraction between molecules

States of Matter

Solid	**Liquid**	**Gas**
		
- Vibrating - Densest - Does not take the shape of its container	- Sliding - Takes shape of its container	- Constant random motion - Least dense - takes complete shape of container. Fill the WHOLE volume

Internal vs External Pressure



Gas Laws and KMT

Charles'	Guy Lussac's
As the temperature increases, the molecules move faster and require more space to move around.	As the molecules heat up, they want to spread out. If they are contained in a closed system, this causes the molecules to collide more often, increasing the pressure.

Chemistry 20 - Unit 2 - Understanding the Kinetic Molecular Theory

Name: _____

You may find the following formulas and constants useful:

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

760.000 mmHg = 101.325 kPa = 1.00000 atm

1000 mL = 1.000 L

STP = 0.00 °C, 101.325 kPa

SATP = 25.00 °C, 100.00 kPa

$T_K = T_{°C} + 273.15$

1. What is internal pressure? Provide an example of internal pressure.	**2.** What is external pressure? Provide an example of external pressure.

3. A cylinder of gas with a movable piston has an internal pressure of 1000.0 kPa. If this cylinder is moved into an environment with an external pressure of 0.1000 kPa, what should happen to the cylinder? Bearing this in mind, why is it important for compressed gas containers to be made of rigid materials?

4. Gases have indefinite shapes and volumes compared to solids (in an open system). Why do gases behave this way?	**5.** Gases fill and assume the shape of their container. Why do they behave this way?

6. Gases are compressible (liquids and solids generally are not). Why is this the case?

7. The pressure exerted by a gas increases when its temperature is increased. Why does this happen?

8. Solids retain their shapes while liquids and gases do not. Why do they behave this way?

9. Liquids assume the shapes of their containers but solids do not. Why do they behave this way?

10. A sample of fluorine gas with a volume of 67.5 L at STP is changed to 146 kPa and 42.0 K. What is the new volume of the gas in kL?

11. A sample of oxygen gas with a volume of 32.6 L at SATP expands to a volume of 69.8 L with a final temperature of 100.0 K. What is the new gas pressure in atm?

12. A sample of nitrogen dioxide gas with a volume of 68.5 L at STP is changed to 116 kPa and has a final volume of 9.87×10^4 mL. What is the new temperature of the gas in degrees Celsius?

13. Swimming pools make use of small quantities of chlorine gas as a disinfecting agent. If 10.0 L of chlorine at 25.00 degrees Celsius and 101.325 kPa is pumped into a pool with a temperature of 15.00 degrees Celsius and a pressure of 800.00 mmHg, what is the new volume of chlorine?

14. Sulfur dioxide gas is a highly toxic substance that Mr. Pruden's lab partner once cooked up by mistake (it was terrifying). If this gas has a volume of 15.0 L at STP, what is its volume at SATP in mL?

15. Sulfur hexafluoride gas is similar to helium in that it can temporarily alter the pitch of a person's voice when inhaled. If this gas occupies a volume of 1.65 L at 37.0 degrees Celsius at 98.6 kPa, to what temperature in degrees Celsius must the subject be heated for the gas to double in volume? You may safely assume that the pressure remains constant