Chemistry 20	Unit 2
Lesson 6 - Combined Gas Law	84 mins

Significant Figures Practice

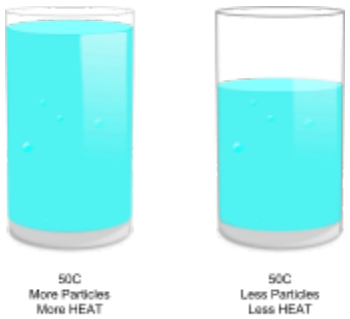
- Why are sig figs important in chemistry/science? BUT not math? - Your answer can NEVER be more accurate then your measurements….	In science the number is a MEASUREMENT. In math they are just arbitrary numbers… Can't create something out of nothing

SENTEO REVIEW

STP vs SATP

STP (Standard Temperature and Pressure) (If you wanted to calculate in a lab) 101.325 kPa or 1.0000 atm @ 0.00C *FYI this is only true in Alberta Chemistry, IUPAC considers STP to be 100.00 kPa @ 0.00C (since 1982)*	SATP (Standard Ambient Temperature and Pressure) (What you'd get in a lab) 100.00 kPa (1 bar) @ 25.00C

What is temperature?

- Temperature is the average kinetic energy of all moving particles. - $E_k = \frac{1}{2}mv^2$	- More total movement (heat) creates more collisions (temperature) 

USE PHeT Activity
https://phet.colorado.edu/en/simulation/legacy/gas-properties

Describe why temperature decreases suddenly when the lid pops off using your understanding of temperature and the combined gas law.

Combined Gas Law

Boyle's Law, Charles' Law and Guy Lussac's law can be combined into one relationship.	$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$ - All units MUST match, Temp. MUST be in Kelvin

Candle in a graduated cylinder demo
Describe in terms of pressure, temperature and volume using the combined gas law your observations.

Combined Gas Law Practice

$P_1 = 100.0\ kPa$ $V_1 = 5.0\ L$ c- $T_1 = 298\ K$ $\longrightarrow$ $P_2 = 300.0\ kPa$ $V_2 =$??? (L) $T_2 = 596\ K$	$\frac{P_1V_1}{T_1} \div P_2 \times T_2 = \frac{P_2V_2}{T_2} \div P_2 \times T_2$ $V_2 = \frac{P_1V_1T_2}{T_1P_2}$ $V_2 = \frac{(100.0\ kPa)(5.0\ L)(596\ K)}{(298\ K)(300.0\ kPa)}$ $V_2 = 3.3\ L$

Chemistry 20 - Unit 2 - Combined Gas Law

Name: _____

You may find the following formulas and constants useful:

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

760.000 mmHg = 101.325 kPa = 1.00000 atm

1000 mL = 1.000 L

1. 49.582 L of chlorine gas at STP is changed to 96.0 kPa at 45.0 C. What is the new volume?

2. A sample of fluorine gas with a volume of 39.94 L at SATP is changed to 111 kPa and 34.0 C. What is the new volume of the gas?

3. A gas sample has a volume of 60.00L at 775 mmHg and 30.0 C. What is the volume at SATP?

4. 48.0384 mL of hydrogen gas at 40.00 C and 110.0 kPa is changed to 10.00 C and 150.0 kPa. What is the new volume?

5. A sample of argon gas has a volume of 39.4829 mL at -23..947 C and 660 mmHg. The temperature increased to 39.94 C and the pressure to 887 mmHg. What is the new volume?

6. A sample of xenon gas has a volume of 120.00 mL at 25.00 C and 3 atm. What temperature would the gas be changed to if when the volume becomes 75.00 mL and the pressure becomes 8 atm?