Reminders 11-19-07:
-Exam 3 Average 69%
-Discuss Physics 2B Enrollment
-Homework 10 Due 11/26
-Homework 11 Due 11/29
-Homework 12 Due 12/4
-Exam 4 12/5.

Objectives:
-Thermal Expansion
-Ideal Gases
-Calorimetry

Aug 26-10:24 PM

$$\sqrt{1.6 \times 10^{-7}} = \sqrt{16 \times 10^{-8}}$$

$$= \sqrt{16} \cdot \sqrt{10^{-8}}$$

$$4 \times 10^{-4}$$

$$\frac{(3.58 \times 10^{20})(3.37 \times 10^{-18})}{(3.58)(3.37)(10^{23})(10^{-18})}$$

$$10^2$$

$$f_c = 10^{50}\ N$$

$$10^{23}\ kg$$

- A 3.0 m^3 container is evacuated to a pressure of 1.7×10^{-6} Pa. How many molecules are in the vessel if the room temperature is 27.0°C?

$$PV = nRT = \frac{N}{N_A}RT$$

$$n = \frac{N}{N_A} = \frac{m}{M} \quad , \quad \frac{R}{N_A} = \frac{8.314}{6.022 \times 10^{23}}$$

$$k = 1.38 \times 10^{-23}\ J/K$$

$$PV = NKT$$

$$N = \frac{PV}{KT} = \frac{(1.7 \times 10^{-6}\ Pa)(3.0\ m^3)}{(1.38 \times 10^{-23}\ J/K)(27+273)}$$

1.2×10^{15} particles

Nov 2-2:58 PM

- If 25.50 moles of an helium gas is at 10°C and gauge pressure of 0.350 atm, calculate the volume of He gas under these conditions in m^3. What is the temperature of the gas if it is compresses to 1/2 its volume at a gauge pressure of 1atm.

$$PV = nRT$$

$$V = \frac{nRT}{P} = \frac{(25.50)(8.314)(283k)}{(1+.350)(101300)}$$

$$= 0.439\ m^3$$

n-

$$n = \frac{PV}{RT}$$

$$\frac{P_1V_1}{RT_1} = \frac{P_2V_2}{RT_2}$$

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2} \; ; \; \frac{V_1}{V_2} = ?$$

$$\frac{V_1}{V_2} = 2$$

solve for T_2

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

$$= \frac{(1atm+1atm)}{(1+.350)} \cdot \left(\frac{1}{2}\right)(283)$$

$$= 210K$$

$$210 - 273 = -63°C$$

Nov 2-2:58 PM

- An automobile tire is pumped to a gauge pressure of 200kPa when it is at 20°C. After the car have been driven at high speed, the temperature has been increased to 50°C. Assuming the volume is unchanged, find the new gauge pressure. Repeat, if the tire expands by 10 percent.

$PV = nRT \quad \frac{P}{T} = \left(\frac{nR}{V}\right)$

$P = \left(\frac{nR}{V}\right)T$

$\frac{P_1}{T_1} = \frac{P_2}{T_2} = \frac{nR}{V}$

$P_2 = \left(\frac{T_2}{T_1} P_1\right) = \frac{323}{293}(101,300 + 200,000)$

$P_2 = 332,000\ Pa$

gauge $P = (332,000 - 101,300) =$

$231,000\ Pa$

$231\ kPa$

$PV = nRT \quad \frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$

$P_2 = \left(\frac{T_2}{T_1}\right)\left(\frac{V_1}{V_2}\right)P_1$

$= \left(\frac{323}{293}\right)\left(\frac{1}{1.1}\right)(101,300 + 200,000)$

$= (302,000\ Pa)$

gauge pressure $= 302,300 - 101,300$

$= 201,000\ Pa$

$= 201\ kPa$

Nov 2-2:58 PM