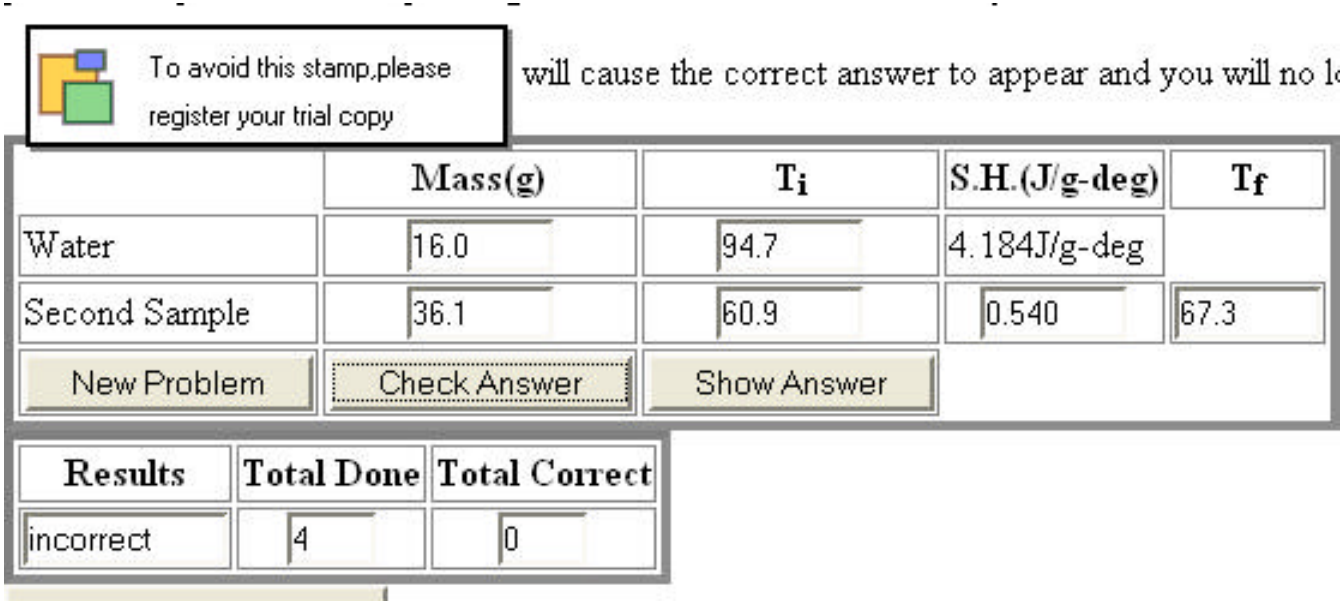
FYI

- HW scores and quiz scores are posted and will be updated with each assignment-please check regularly.
- Exam next Thurs-nomenclature, chapters 8 and 9 with the following exceptions
  - Entropy(8.13,8.14)
  - Using Bond energies to calculate enthalpies
- You should anticipate an exam of 4-5 pages and approx 12-15 questions. All needed equations and constants will be provided (or may be requested). Bring your periodic table and know what's where.
- Exam will most certainly involve more than doing computations. You should expect that you will have to discuss principles and also present logical analysis

- What's wrong with this?



A few statistics

- There are 6 binary gas laws
- Each law has four different variables
- Each variable (except n) can have at least two different dimensions
- Thus there are 6*8=48 different datasets which can be presented.
- For any problem, there are four different possible “unknowns” which, in principle, require different algebraic approaches
- Hence, the total set of variations is 4*48=192. This seems absurd, but the actual number of variations is more than this due to the differences in problem presentation which are possible.
- Even given that some of these are “redundant” (V_1 vs V_2), it is clearly impossible to prepare by just doing a bunch of problems. The major gain in doing practice problems is honing math skills and learning to approach problems systematically

A General View of Binary Gas Problems

- What are the keys?
- Recognition
- Identifying whether the relationship is direct or inverse
- Forming an expectation
- Proper treatment of dimensions
- Application of the correct algorithm (D vs I)
- Careful arithmetic (It’s really not algebra)

- A sealed gas system has a volume of 0.123L at a pressure of 230torr. If the pressure changes to .600atm at constant T, what is the new volume in mL?
- $(P \ \& \ V)_{n,T}$ are inversely related.
- What do you expect
- (*)/ = V (in L)
- dimensions must agree
  - 0.123L=123mL
  - 230torr=.303atm
- (123*.303)/.600=62.1mL
- Variations-Would you have recognized the difference if it had said **increased by** .600atm. Failure to note “increases by” vs “increases to” is a “fatal” error.

- A sealed cylinder at 120^{o}C undergoes a temperature change to 230K at which point the pressure is found to be 1.13atm. What was the initial P in mm?
- T and P are direct
- what do you expect
- (/)* = P in mm
- convert T as needed 120^{o}C=393K
- 1.13atm=859mm(torr)
- (859/230)*393=1470mm
- OK- that’s two examples only 190 to go

- Consider the dataset shown below. Explain **why it is invalid** without doing any calculations. What changes could be made to make the dataset legitimate?
- P1=1.75atm P2=1.45atm
- V1=11.3L V2=9.30L
- T1=477K T2=281^{o}C
- n1=n2

- A gas system has P=0.50atm,T=303K and n=0.016moles. Some of the gas escapes under conditions of constant V after which it is found that P=260torr and T= -10^{o}C How many moles of gas were lost?
- What is the relationship between (P,T and n)$_{V}$
- What equation fits the change of state described?
- What would you estimate the correct answer to be?
- How would you actually solve the problem?
- What's the answer?

- Consider the combustion of C_2H_6
- The reaction mixture has an initial pressure of 1.00atm. If the reaction is carried out under conditions such that all of the product are gases and T and V, what is the pressure after the reaction is over?
- If the same reaction is carried out under conditions of constant P and T and the water is produced as a liquid, by what factor would the volume change?

- In a Dumas bulb expt, it is found that at 100.0^{o}C and 735mm, 0.076g of vapor has a volume of 123. What is the gmw?

A gas cylinder with a volume of 150L is at a temperature of 295K and a pressure of 85atm. Without using a calculator, estimate the number of moles of gas present. Outline your reasoning.

- If it is found that chlorine gas effuses at a rate of 230mm/sec. Under the same conditions, at what rate would hydrogen effuse?

- At STP, a gas mixture contains 2.14g of CH_4, 4.15g of Ne and 12.1g of C_3H_8. What are the partial pressures of the gases.

- If you add Ne until its partial pressure is doubled, what is the resultant mole fraction of CH_4?

- Consider a mixture of three gases, A, B and C. The total pressure and the partial pressure of one of the gases are known,
- What else is needed to determine all of the partial pressure?
- What else is needed to determine the total number of moles of gas present?