Is there a clear denotation of fundamental variables?

Unclear to me what you are asking. Are you asking if ‘fundamental’ variables have connotations/are associated with other concepts, e.g. ? What do you mean by ‘fundamental variable’?

Do we need Che 320 for this class? By looking at the syllabus there seems to be a need for an understanding of the material in that class. However, there is a select few of us that have not taken that course.

Yes, I am assuming you already know how to do descriptive statistics as related to fitting functions to x,y data. I would be glad to provide materials on this to students as needed, as prior students have requested dropping this topic due to repetitiveness.

Going off the discussion of class today, how can we remain useful and successful in the future as technology increase?

There is no simple answer to this question. One issue is how you choose to define ‘useful’ and ‘successful’. Assuming you mean something like having opportunities the provide compensation at a level of current engineers, then the superficial response is to learn how to learn (cognitive understanding/flexibility and planning), a willingness to work and embrace uncomfortable short term change for longer term gains, and take in/process large amounts of information to deduce trends of change.

How can we be successful in this class?

Assuming you have learned/understood prior course materials (which may unclear), see the comments to the above question and comments in class regarding recognizing the importance of human interaction. I do not equate ‘success’ with grades. The value of education is not measured by grades, but rather by how the topical materials are relevant to your life goals/desires. Not all topical materials are knowledge based. Some are based in cognitive information processing to be able to analyze, synthesize, and evaluate situations/circumstances.

How will this class translate to the real-world application in our future disciplines?

The knowledge based portions are useful, but may have limited direct application to most of your immediate job needs (depends on what the needs are). However the process of thinking/planning (cognitive analysis/synthesis/evaluation) that you hopefully learn will pay dividends the rest of your life regardless what you do.

When answering questions would you prefer students to raise their hand or blurt out answers?

Raise hands or find a way to be courteous to others in sharing your thoughts.

I would appreciate a better understanding of the following.

The practical use of fugacity and its relationship to Gibbs Free Energy

Fugacity is made up concept as a way to describe the vapor-liquid behavior of real mixtures of components, i.e. composition in the vapor phase based on the liquid composition. It is based on the physical structure of how molecules interact with each other in the condensed phase (liquid) vs. the dispersed phase (vapor).

The interactions of molecules can be understood as energetic interactions (e.g. kinetic molecular movement, intermolecular attraction/repulsion). Different molecular structures have different interactions with other molecules. Since the liquid mixtures are relatively easily measured and are the same T, P as the vapor, the Gibbs energy is the most convenient way to relate the vapor composition. (You may recall that the Gibbs energy is a function of T, P, and composition. At constant T and P, Gibbs energy is only a function of composition and the 1st law says dG(liquid)=dG(vapor), so if either dG(phase) can calculated the other is known and can be used to calculate composition.

The assumptions of transition state theory, why it is a plausible alternative to collision theory, and advantages of each theory in different modeling scenarios.

The concept of collision theory for chemical reactions is that the kinetic energy of molecules is sufficient to re-arrange the internal energy (chemical bond energy) during collisions. It assumes the energy transformation is instantaneous. Hence, the rate of reaction is solely dependent on the frequency/rate of collisions.

Transition state theory assumes there are multiple energetic interactions/molecular configurations that occur after the initial collision. These re-arrangements have finite stability/time periods based on stability of the various high energy species. This allows another factor to account for the time in the rate of reaction.

Hence, transition state theory provides more flexible way to understand/model rates of chemical reactions.

 - The molecular mechanisms that result in enthalpy changes in fat hard to model

I don’t understand your question. Are you talking about triacylglycerides and enthalpy changes due to molecular rearrangement during phase changes?

 - The difference between flow work and shaft work

Not quite sure I understand what you mean by flow/shaft work. Traditionally, flow work is the energy contained by a fluid as it moves through a conduit, i.e. kinetic mass energy based on velocity. Shaft work is the energy needed to mechanically impart energy from a solid mechanical device (e.g. a pump) to a fluid to increase its kinetic energy, e.g. to cause mixing or movement. Either can be converted into other forms of energy, e.g. electricity, mechanical work, heat, etc.