

Midterm Exam May 2nd, 2005

In the text below you will see the term *find* used whenever you are asked to perform a MATLAB calculation which assigns numerical values to the predefined variables `t,p,n0,N,x,m0,hrx,gmin,ta,l`

1. (10%) Find a complete set of independent reaction equations (`N`= stoichiometry matrix).
2. (10%) Find the equilibrium composition (`x`= mole fractions) at your given system temperature `t`, pressure `p` and feed composition `n0`.
3. (10%) Find the isothermal enthalpy of reaction (`hrx`= negative heat of reaction) at the conditions given in (2).
4. (10%) Find the equilibrium Gibbs energy (`gmin`) at the conditions given in (2). Specify the standard state chemical potentials in `m0`.
5. (40%) Find the adiabatic reaction temperature (`ta`), accurate to within ± 5 [K], using (2) as inlet conditions. Assume isobaric reaction.
6. (20%) Find the equilibrium chemical potentials (`l`) of the *elements* `Na`, `F2` and `Al` at the conditions given in (2). Use the same standard state as in (4). Compare (verify) the solution with the equilibrium state calculated above. Least square solutions are not accepted.

Run the MATLAB code `midterm.p` to get information about the chemical system (components, temperature, pressure, etc.), and `tutor.p` to check your results online (these files are not human readable). Please note that the program only checks that the calculated numbers are OK, it does not check the semantics of the calculations. It is therefore possible to have a meaningless calculation pass `tutor.p` if only the final numbers are correct. You are kept responsible for the correctness of the code independent of what `tutor.p` tells you.

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