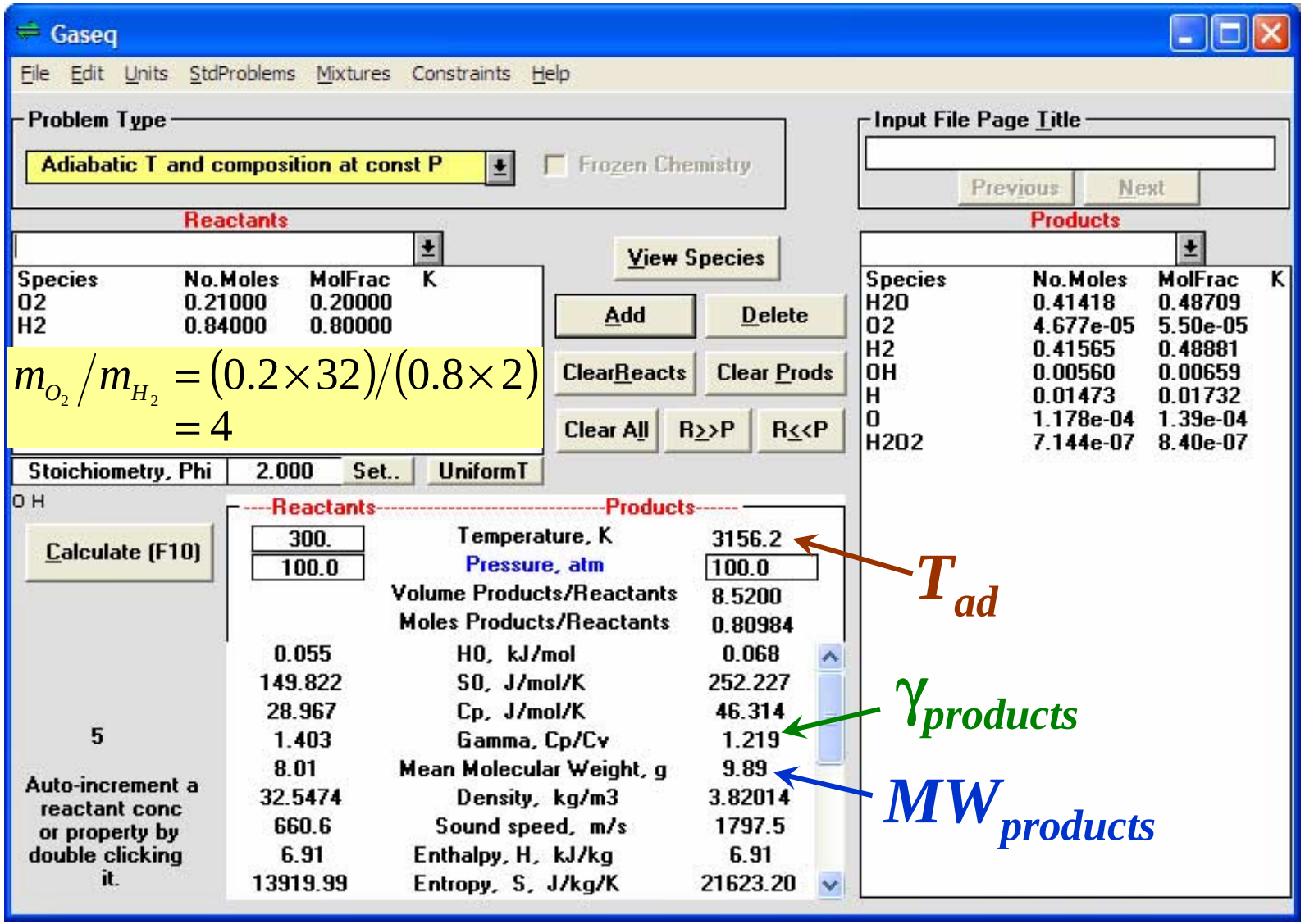
Combustor Calculations

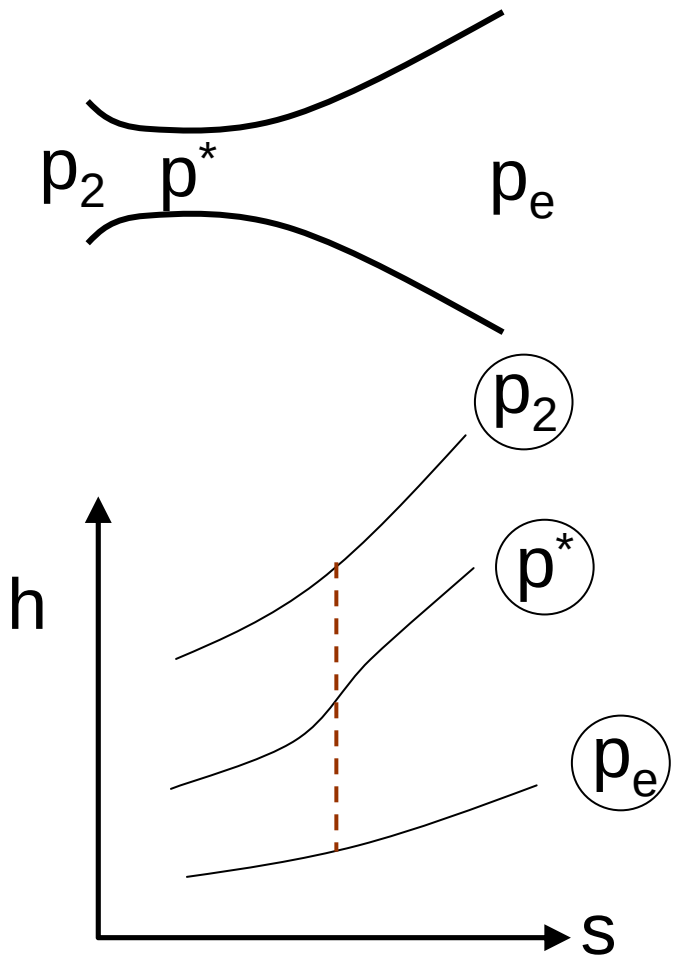
- Peform **adiabatic flame temperature** calculation with full equilibrium products
  - pressure = chamber pressure
  - total enthalpy unchanged

Example Method – Gaseq

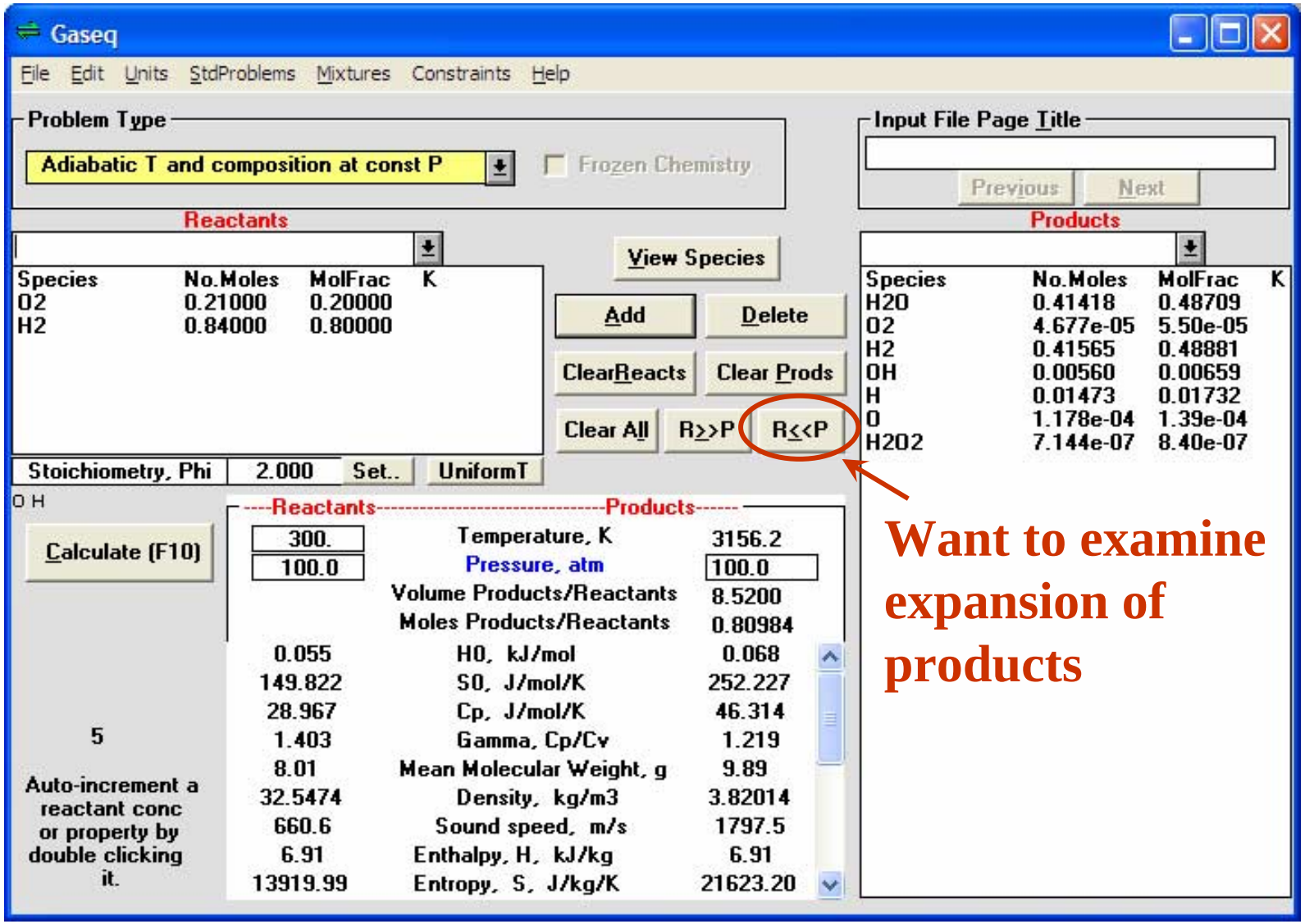


Isentropic Expansion

- Constant γ is a very poor assumption for high temperature rocket product gases
  - can't use $p/p_o=(T/T_o)^{\gamma/\gamma-1}$
  - even worse assumption if gas is reacting
- Can still calculate **isentropic** nozzle expansion for two cases
  - flow stays in **equilibrium** through nozzle (***shifting equil.***)
  - flow is **frozen** - composition can not change
  - find h (and thus u) that matches given p and s

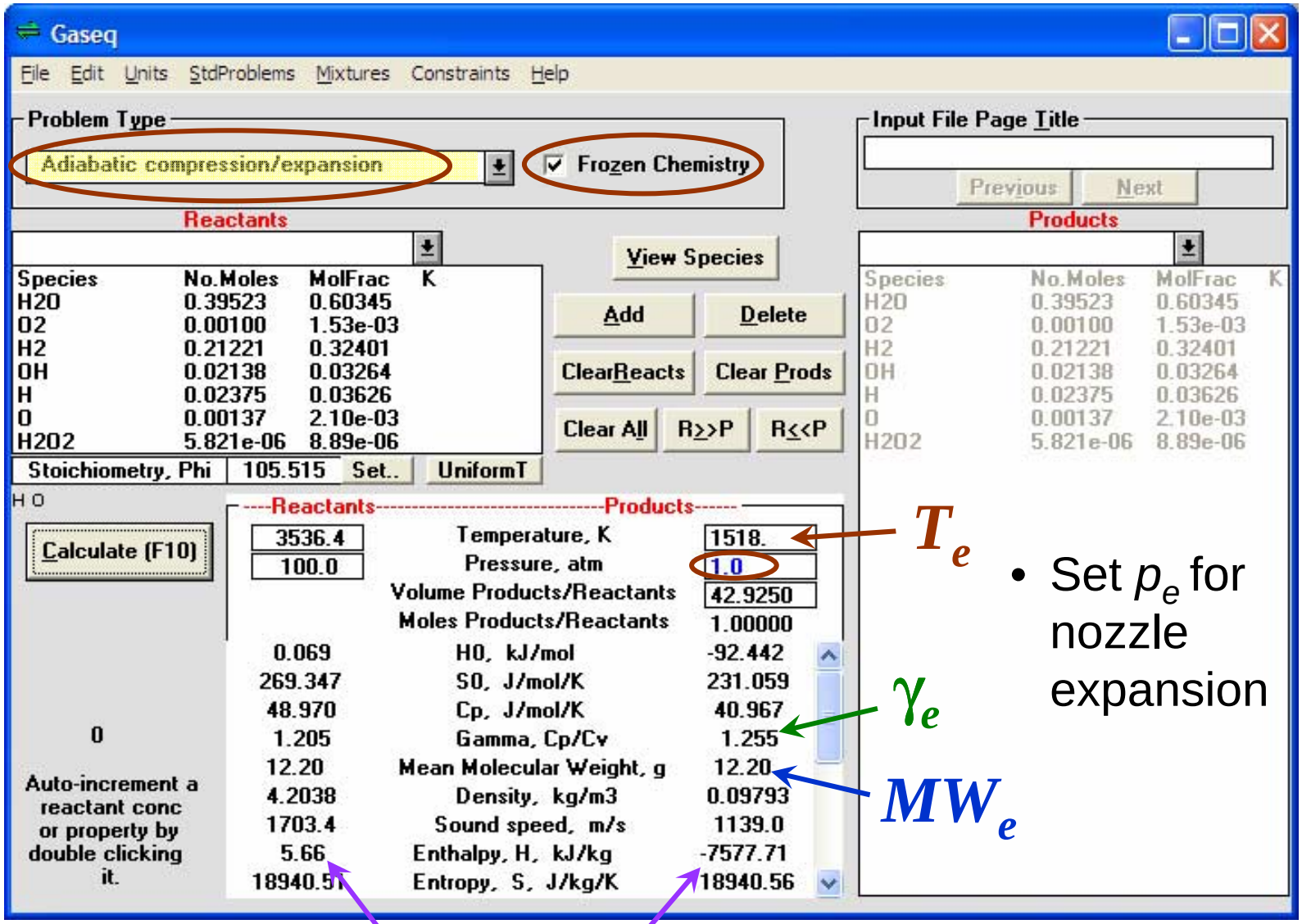


Example Method – Gaseq



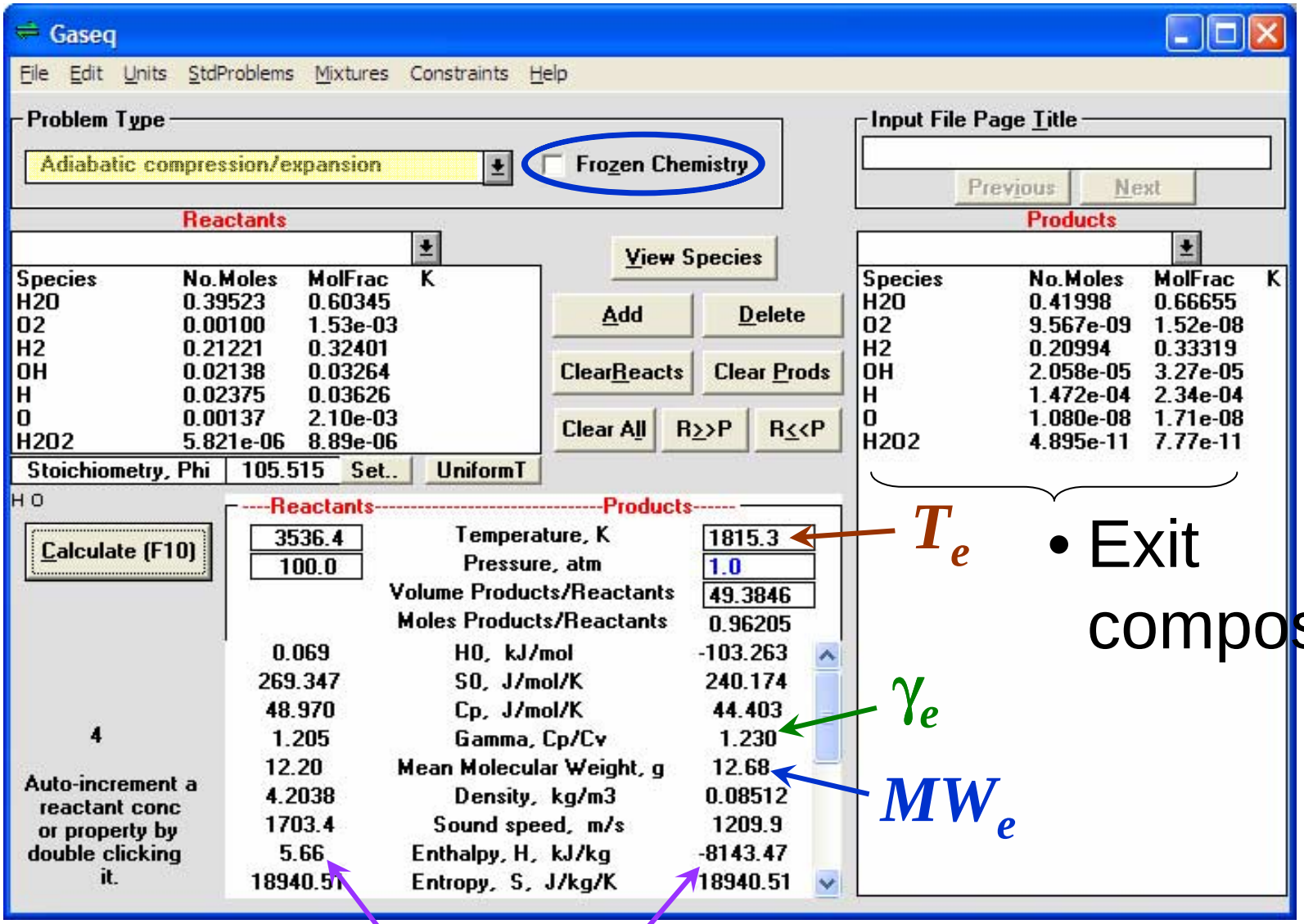
Want to examine expansion of products

Example – Frozen Chemistry



- Set p_e for nozzle expansion

Example – Shifting Equilibrium



- Exit composition