System Constants

- Unit of gas flow rate (SLM)
  - We usually use SLM, Standard Liter per Minute, where the "standard" condition is 0 °C and 1 atm (in most cases). This definition can be found at many websites for example at Wikipedia.
  - Most of our flow controllers/monitors are of Teledyne Hastings. This Teledyne Hastings page mentioned "Teledyne Hastings Instruments assumes STP of 0 °C and 760 Torr".
  - Note that the flow rates recorded in our system (in unit of SLM) have already been converted to the volumes at the standard condition. They don't vary with the condition (i.e. temperature and pressure) of the gas flowing was.
- Volume conversion between LHe and gHe: 1 L of LHe 700 L of gHe at 0 °C and 760 Torr
  - The density of gHe is 22.426 L/mol at 0 °C and 760 Torr, according to this NIST Chemistry WebBook. It is almost of the ideal gas (22.4 L /mol).
  - The density of LHe is 125 g/L. Thus 1 L of LHe contains 125/4 = 31.25 mol.
  - The volume of gHe made from 1 L of LHe is 31.25 mol * 22.426 L/mol = 700.8 L (at 0 °C and 760 Torr).
- Amount of helium in Outside gHe Tank
  - The volume of the outside gHe tank: V = **1600 cubic feet = 45306.95 L**
  - 1 psi of gHe at 300 K in the outside gHe tank = 4.1 L of LHe — R_gL = 4.1 L/psi at 300 K
    - P_atm = 14.7 psia
    - C_gL = 750 — 1 L of LHe = 750 L of gHe at 300 K, 1 atm
    - R_gL = V / P_atm / C_gL = 4.1 L/psi
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