Chemistry 230 -- Quiz 2
September 14, 2001 — Tellinghuisen

Pledge and signature:

Note: If you want your paper returned folded (i.e., score concealed), please print your name on the back.

1. (8) **Short problems:**
   
   (a) Evaluate \( \int_{1/2}^{\infty} V^{-2} \, dV \):
   
   (b) Calculate \( \log_{10} (3.79 \times 10^9) \):

   (c) Calculate \( \log_{22} 8 \):

   (d) Find \( \frac{dy}{dx} \) if \( xy = y - 2 \):

2. (3) A sample of gas is contained in the mercury manometer shown at right. If the atmospheric pressure is 744 torr and \( h = 55 \text{ mm} \), what is the pressure of the trapped gas (in torr) ?

3. (10) Give the van der Waals equation for a real gas, and use it to calculate the pressure of a sample of CO\(_2\) at 311K and a concentration of 1.000 mol/L. For CO\(_2\), \( a = 3.59 \times 10^6 \text{ cm}^6 \text{ atm mol}^{-2} \) and \( b = 42.7 \text{ cm}^3/\text{mol} \). (See board for \( R \) values.)

4. (5) A hypothetical gas obeys the equation of state \( PV = nRT (1 + aP + bP^2) \), where \( a \) and \( b \) are constants. Give the definition of \( \kappa \) and use it to obtain an expression for \( \kappa \) for this gas.