const1 = 100;
const2 = 50;
deltaE1 = 8.314 * 77 * Log[const1]  
deltaE2 = 8.314 * 77 * Log[const2]
pVap = 1;
monolayerCap1 = 300; (*cc/g*)
monolayerCap2 = 100;

amtAdsorbed1 =
monolayerCap1 + const1 * pressure / ((pVap - pressure) * (1 + (const1 - 1) * pressure / pVap));

amtAdsorbed2 = monolayerCap2 + const2 * pressure / ((pVap - pressure) * (1 + (const2 - 1) * pressure / pVap));

Plot[{amtAdsorbed1, amtAdsorbed2}, {pressure, 0, 0.6},
PlotStyle -> {{RGBColor[1, 0, 0]}, {RGBColor[0, 0, 1]}}];

What is a "typical" value of BET intercept and monolayer capacity?

vFI = 100; (*cc(STP)/g*)
surfArea = vFI / 12400 * 6.022 * 10^23 * (15 * 10^-20) (*m^2/g*)

n = 2;
const = 100;
monolayerCap = 100;

amtAdsorbed2 = monolayerCap + const * relP / (1 - relP) * 
(1 - (n + 1) * relP^n + n * relP^(n + 1)) / (1 + (const - 1) * relP - const * relP^(n + 1));

Plot[{amtAdsorbed2, {relP, 0, 1}}];
### N2 on 0.606 g of silica gel (Figures 1 and 2)

<table>
<thead>
<tr>
<th>P/V/(P_0-P)*10^3</th>
<th>P/P_0</th>
<th>P/V/(P_0-P)*10^3</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.90E+00</td>
<td>0.220</td>
<td>3.20E+00</td>
</tr>
<tr>
<td>3.15E+00</td>
<td>0.235</td>
<td>3.50E+00</td>
</tr>
<tr>
<td>3.70E+00</td>
<td>0.280</td>
<td>4.20E+00</td>
</tr>
<tr>
<td>2.45E+00</td>
<td>0.18</td>
<td>2.75E+00</td>
</tr>
<tr>
<td>1.40E+00</td>
<td>0.105</td>
<td>1.65E+00</td>
</tr>
<tr>
<td>3.00E-01</td>
<td>0.020</td>
<td>2.00E-01</td>
</tr>
</tbody>
</table>

Slope at 90.1 K = 1.51E-02  
Intercept at 90.1 K = ???  
Slope at 77 K = 0.01313  
Intercept at 77 K = 0.000039

![Graph showing linear regression equations and R² values](image)

- Linear (90.1 K): \( y = 13.139x + 0.0392 \)  
  - \( R^2 = 0.9995 \)
- Linear (77 K): \( y = 15.095x + 0.0331 \)  
  - \( R^2 = 0.9974 \)

**Note:** Readings accurate enough?
molWt = 28;
density = 0.751;
MolArea = 4 * 0.366 * (molWt / (4 * 2^0.5 * 6.022 * 10^23 * density))^(2/3)
 (*see Emmett and Brunauer, JACS, 1937* )

\[ 1.70757 \times 10^{-35} \]

\[ 17 \text{Å}^2/\text{molecule} \]

\[ \text{Clear}[\text{VM}, \text{c}] \]

\[ \text{soln1} = \text{Solve}[(\text{c} - 1)/\text{VM}/\text{c} = 2 \times 10^{-3} \text{, } \{\text{VM} \rightarrow 0.205 - 0.065 \text{, } 1/\text{VM}/\text{c} = 0.2 \times 10^{-3}\}, \{\text{VM}, \text{c}\}] \]

\[ \{\{\text{VM} \rightarrow 69.0335, \text{c} \rightarrow 72.4286\}\} \]

\[ \text{vm\_norm} = \text{soln1}[\{1, 1, 2\}] / 0.606 \]

\[ \text{cNew} = \text{soln1}[\{1, 2, 2\}] \]

\[ 113.917 \]
\[ 72.4286 \]

\[ \text{deltaE} = 1.987 \times 90.1 \times \text{Log}[\text{cNew}] \]

\[ 766.708 \]

\[ \text{surfaceArea} = 116.2 / 22400 \times 6.022 \times 10^{-23} \times 16.2 \times 10^{-20} \]

\[ 506.074 \]

Analysis of Figures 1 and 2 in Brunauer et al., 1938). See also Brunauer_1938_Paper.xlsx. Do the numbers obtained agree with those appearing in the table(s)? Any adjustments necessary?

\[ \text{Clear}[\text{slopel}, \text{intercept1}, \text{const1}, \text{VM}] \]

\[ \text{slopel} = 13.13 \times 10^{-3}; \]
\[ \text{intercept1} = 0.039 \times 10^{-3}; \]

\[ \text{soln1} = \text{Solve}[(1/\text{VM}/\text{const1} == \text{intercept1}, (\text{const1} - 1)/\text{VM}/\text{const1} == \text{slopel}), (\text{VM}, \text{const1})] \]

\[ \text{const1a} = \text{soln1}[\{1, 2, 2\}] \]
\[ \text{deltaE} = 1.987 \times 77 \times \text{Log}[\text{const1a}] \]

\[ \{\{\text{VM} \rightarrow 75.9355, \text{const1} \rightarrow 337.667\}\} \]

\[ 75.9 \text{cc} \]
\[ 0.608 \text{g} \]

\[ = 12.9 \text{cc} \text{g}^{-1} \]

\[ (\text{vs. } 116.2 \text{ in Table I}) \]

\[ 337.667 \]
\[ 890.769 \]

\[ \text{See also Table II} \]

\[ \text{Comments?} \]

\[ \text{Ok!} \]

\[ \text{Compared favorably with 794 Cal/mol} \]

\[ \text{(Table I)} \]

\[ \text{Angel drop box!} \]