

Experiment-7 Joule-Thomson effect

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Joule Thomson Coefficient of CO₂

```
In[1]:= p1 = Range[0, 0.85, 0.05];  
t1 = {-0.12, -0.06, -0.02, 0.03, 0.09, 0.14, 0.2,  
      0.23, 0.31, 0.36, 0.4, 0.46, 0.52, 0.56, 0.6, 0.65, 0.71, 0.75};
```

```
In[3]:= data1 = Transpose[{p1, t1}];  
lm1 = LinearModelFit[data1, x, x]
```

```
Out[4]= FittedModel[ $-0.116433 + 1.03344 x$ ]
```

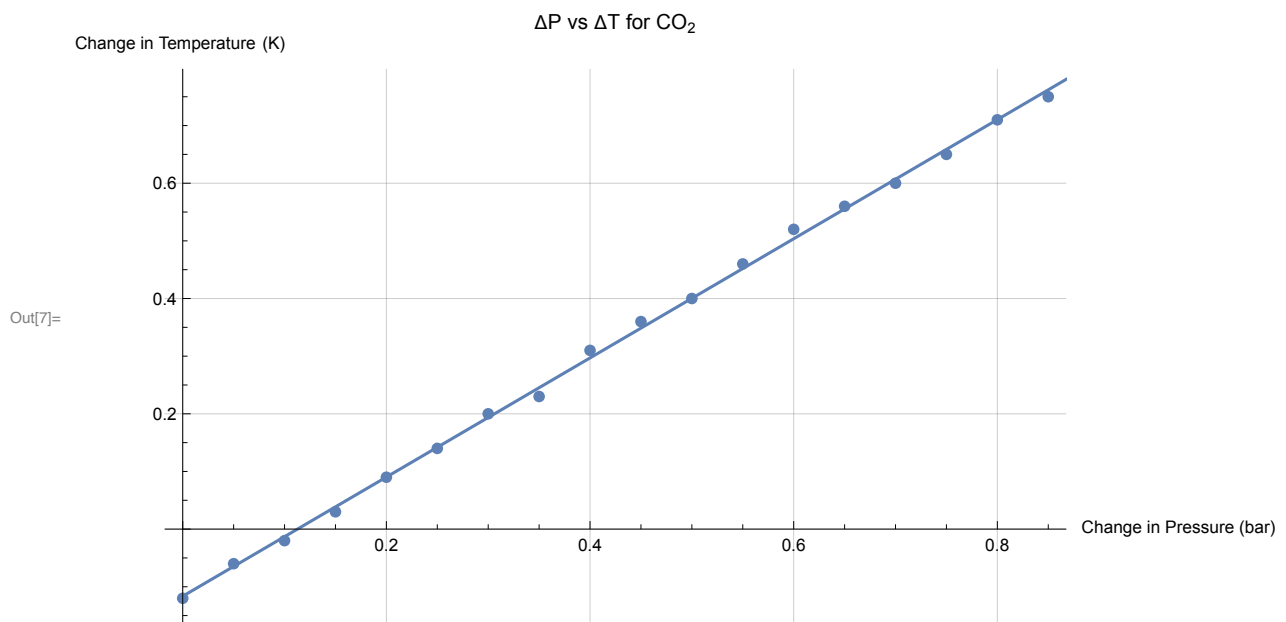
```
In[5]:= Normal[lm1]
```

```
Out[5]=  $-0.116433 + 1.03344 x$ 
```

```
In[6]:= RootMeanSquare[data1[[All, 2]] - # /@ data1[[All, 1]] & /@ {lm1}
```

```
Out[6]= {0.00868246}
```

```
In[7]:= Show[ListPlot[data1,  
  AxesLabel → {"Change in Pressure (bar)", "Change in Temperature (K) "},  
  Plot[lm1[x], {x, 0, 1}], PlotLabel → "ΔP vs ΔT for CO2", GridLines → Automatic]
```



$$\mu_{\text{CO}_2} = (1.03344 \pm 0.00868246) \times 10^{-5} \frac{\text{K}}{\text{pa}}$$

Joule Thomson Coefficient of N_2

```
In[8]:= p2 = Range[0, 1, 0.05];
t2 = {-0.08, -0.06, -0.05, -0.04, -0.03, -0.01, -0.01, 0.0, 0.01,
      0.01, 0.02, 0.03, 0.04, 0.06, 0.07, 0.08, 0.1, 0.11, 0.11, 0.12, 0.12};
```

```
In[10]:= data2 = Transpose[{p2, t2}];
lm2 = LinearModelFit[data2, x, x]
```

```
Out[11]= FittedModel[ $-0.0722078 + 0.201558 x$ ]
```

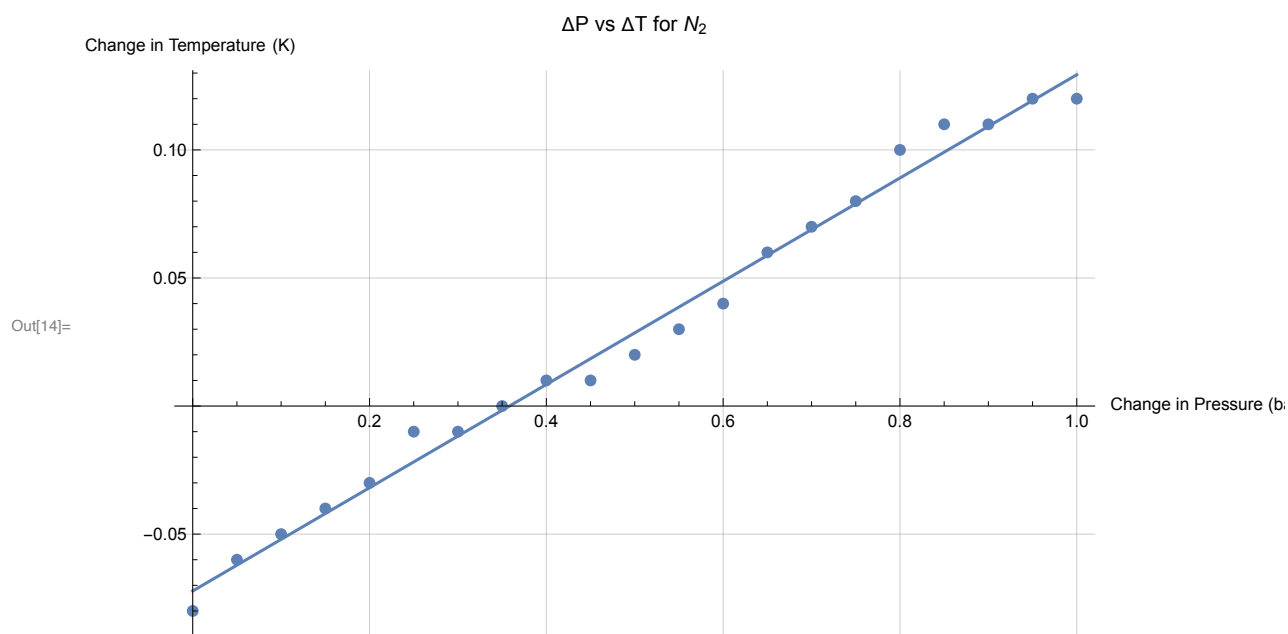
```
In[12]:= Normal[lm2]
```

```
Out[12]=  $-0.0722078 + 0.201558 x$ 
```

```
In[13]:= RootMeanSquare[data2[[All, 2]] - # /@ data2[[All, 1]] & /@ {lm2}
```

```
Out[13]= {0.00637132}
```

```
In[14]:= Show[ListPlot[data2,
  AxesLabel → {"Change in Pressure (bar)", "Change in Temperature (K)"}],
  Plot[lm2[x], {x, 0, 1}], PlotLabel → "ΔP vs ΔT for N2", GridLines → Automatic]
```



$$\mu_{N_2} = (0.0201588 \pm 0.00637132) \times 10^{-5} \frac{K}{pa}$$