

Problem 5 v2.xls

|                                 |                                                            |                      |             |             |             |             |    |            |            |         |
|---------------------------------|------------------------------------------------------------|----------------------|-------------|-------------|-------------|-------------|----|------------|------------|---------|
| <b>Homework Problem #5</b>      |                                                            | CH4+2O2=CO2+H2O      |             |             |             |             |    | SR=        | 1.1        |         |
| Chemical Engineering 310        |                                                            |                      |             |             |             |             |    |            |            |         |
| Heat Capacity Data (from JANAF) |                                                            | Cp Units: cal/gmol-K |             |             |             |             |    | kcal/gmol  | kcal/gmol  |         |
|                                 | a                                                          | bT                   | cT^2        | dT^3        | eT^4        | fT^5        | n  | Del H forr | Del G forr | n_react |
| CH4                             | 2.881                                                      | 2.05E-02             | -7.65E-06   | 1.37E-09    | -1.12E-13   | 2.97E-18    | -1 | -17.889    | -12.14     | 1       |
| O2                              | 6.031                                                      | 3.79E-03             | -2.07E-06   | 6.32E-10    | -9.33E-14   | 5.20E-18    | -2 | 0          | 0          | 2.2     |
| H2O                             | 7.52                                                       | 9.45E-04             | 2.39E-06    | -1.25E-09   | 2.30E-13    | -1.45E-17   | 2  | -57.798    | -54.6357   | 0       |
| CO2                             | 5.598                                                      | 1.34E-02             | -8.05E-06   | 2.39E-09    | -3.41E-13   | 1.87E-17    | 1  | -94.052    | -94.2598   | 0       |
| CO                              | 6.401                                                      | 1.77E-03             | -2.24E-07   | -1.01E-10   | 3.09E-14    | -2.32E-18   | 0  | -26.416    | -32.8079   | 0       |
| H2                              | 7.011                                                      | -6.83E-04            | 1.35E-06    | -4.96E-10   | 7.69E-14    | -4.36E-18   | 0  | 0          | 0          | 0       |
| N2                              | 6.532                                                      | 1.20E-03             | 2.39E-07    | -2.57E-10   | 5.44E-14    | -3.64E-18   | 0  |            |            | 8.28    |
| Net                             |                                                            |                      |             |             |             |             |    | -191.76    | -191.391   | 11.48   |
|                                 |                                                            |                      |             |             |             |             |    | 191759     |            | 11.48   |
| Products                        | 75.90427619                                                | 0.026005857          | -1.7191E-06 | -2.0962E-09 | 5.49175E-13 | -3.9453E-17 |    |            |            |         |
| Tref                            | 298                                                        |                      |             |             |             |             |    |            |            |         |
| T adiabatic                     | 2192                                                       |                      |             |             |             |             |    |            |            |         |
| Energy (Del H)                  | 191759                                                     |                      |             |             |             |             |    |            |            |         |
|                                 |                                                            |                      |             |             |             |             |    |            |            |         |
|                                 |                                                            |                      |             |             |             |             |    |            |            |         |
|                                 | Remember to add in enough N2 and O2 to the product stream. |                      |             |             |             |             |    |            |            |         |