**South Dakota School of Mines and Technology**

**Department of Materials and Metallurgical Engineering**

MET 321 Calculations Lab #6 17, 18

17. Endo gas generators are used to produce carburizing gas. The below fuel is to be used. Given the air fuel ratio, determine the indicated equilibrium output gas composition at 980 °C.



Active worksheet ↑

Hint: Break down all input gases to the equivalent moles of C, O, H, and N and use these amounts for the input moles of each element in the mole balances.

Assume the amount of O2 and CH4 are small compared to CO, CO2, H2, H2O, and N2 in the four mole balances. Use the reaction

CO + H2O = CO2 + H2 K

and the three mole balances for C, H, and O to solve for the equilibrium moles of CO, CO2, H2, H2O. Then use the following reactions to find the moles of O2 and CH4:

CO + ½ O2 = CO2 Ko

CO + CH4 = CO2 + 2H2 Km

Verify the assumptions and do an iteration to converge on the correct solution as required.

Data at 1253 K

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| --- | --- | --- |
| CO+H2O=CO2+H2 | K | 0.6314 |
| CO+0.5O2=CO2 | Ko | 1.751E+07 |
| CO2+CH4=2H2+2CO | Km | 9935 |

18. Endo gas generators are used to produce carburizing gas. The below fuel is to be used. Given the air fuel ratio, determine the indicated equilibrium output gas composition at 980 °C using ThermoCalc.



Active worksheet ↑