Homework 8

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The densities of and iron are 7.571 and 7.633 respectively at their transformation temperature of 910 °C under 1 bar. The enthalpy of phase change,, from to is 900 J/mol at 910 °C and 1665 J/mol at 827 °C. Assuming that (a) is independent of pressure but varies linearly with temperature, and (b) the value of is constant, calculate the pressure under which both forms of iron coexist at 827 °C.

Temperatures in kelvins:

Equation for as a function of temperature:

Therefore:

Assuming 1 g of iron:

Therefore:

Mole of 1 g of iron:

Transformation enthalpy for 1 mole:

Transformation enthalpy for :

Integrate for temperature:

Pressure: