EG3029 Chemical Thermodynamics

Tutorial 6

Problem 1:

For a lab experiment an amount of 2 litres of an antifreeze solution is required. The solution should consist of 30 mol% methanol in water. Determine the volumes of pure methanol and pure water at 25°C that must be mixed to yield the 2 litres of solution. Partial molar volumes for MeOH and water in 30-mol-% methanol solution and their pure-species molar volumes, both at 25°C, are: *(1.017 l; 1.053 l)*

Methanol (1): $\bar{V}_1 = 38.632 \frac{litres}{kmol}$ $V_1 = 40.727 \frac{litres}{kmol}$

Water (2): $\bar{V}_2 = 17.765 \frac{litres}{kmol}$ $V_2 = 18.068 \frac{litres}{kmol}$

What would be the volume if an ideal solution were formed? *(2.070 l)*

Problem 2:

What is the change in entropy when 700 litres of carbon dioxide and 300 litres of nitrogen, each at 1 bar and 25°C blend to form a gas mixture at the same conditions? Assume ideal gases. *(204.885 J/K)*