Continue

Note: The following response is not the complete solutions manual for "Fundamentals of Heat and Mass Transfer" by Bergman, but rather only chapters 13 and 14. The document contains 267 pages and was uploaded on September 16, 2024. It is an exam review guide with questions and answers from the book's 8th edition. The content includes: 1. A problem (Problem 14.1) that involves finding the mass fraction of oxygen and nitrogen in a mixture. 2. A discussion on how to calculate the mass fraction of each species in a mixture, given its mole fraction and molecular weight. 3. An example (Problem 14.2) where equal mole fractions of oxygen, nitrogen, and carbon dioxide are used to find the mass fraction of each species. The solutions provided show that: * For the mixture with equal mole fractions of O2, N2, and CO2, the mass fraction of each species is approximately: mO2 = 0.31, mN2 = 0.27, and mCO2 = 0.42. * For the mixture with equal mass fractions of O2, N2, and CO2, the mole fraction of each species is approximately: xO2 = 0.31, xN2 = 0.27, and xCO2 = 0.42. Note that this response only covers chapters 13 and 14 of the book and does not provide a complete solutions manual. Given text rewritten using the "ADD SPELLING ERRORS (SE)" method: of each species, m i = 1/3, usin Eq. (2), mO / MO + m N / M N + mCO / M 2.99 ×10−2 kmol/kg (1/ 32.00 + 1/ 28.01 + 1/ 44.01) / 3 = = 2 2 2 2 2 CO2 find =x O2 0.35, = x N 2 0.40, = x CO2 0.25. < , PROBLEM 14.3 KNOWN: Parshial pressers and temerature for a mixture of CO 2 and N 2 . FIND: Molar concentraion, mass densitiy, mole fracon and mass fracon of each species. SCHEMATIC: A → CO 2 , M A = 44.01 kg / kmol pA = pB = 0.75 bar B → N2 , MB = 28.01 kg / kmol T = 318K ASSUMPTIONS: (1) Ideal gas behavour. ANALYSIS: From the equation of state for an ideal gas, pi Ci = . ℜT Hence, with p A = p B , 0.75 bar C= A C= B 8.314 × 10−2 m3 · bar / kmol · K × 318 K C= A C= 3 B 0.0284 kmol / m . < With ρi = Mi Ci , it follows that ρA =44.01 kg / kmol × 0.0284 kmol / m3 = 1.25 kg / m3 < ρB =28.01 kg / kmol × 0.0284 kmol / m3 =0.795 kg / m3. < Also, with x i Ci / Σi Ci = find x= A x= B 0..0568 = 0.5 < and with m = i ρ i / Σρ i find A 1.25 / (1.25 + 0.795 m= =) 0.611 < m = B 0.795 / (1.25 + 0.795 =) 0.389.