M E 433

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Lecture 02

Today, we will:

- Continue introductory material fundamentals and review, gas mixtures
- Do some example problems

Consider a tank filled with air plus some gaseous contaminants (pollutants):

From previous lecture, we had:
$$m_t = \sum_{j=1}^J m_j = \sum_j m_j = \sum_j m_j$$

(total mass is the sum of the mass of each species)

Similarly,
$$n_t = \sum_{j=1}^J n_j = \sum_j n_j = \sum_j n_j$$

(total number of mols is the sum of the number of mols of each species)



Example: Ideal gas mixture

Given: A simple natural gas mixture is composed of three chemicals:

- Methane (CH₄), 90% mol fraction
- Ethane (C_2H_6) , 8% mol fraction
- Propane (C_3H_8), 2% mol fraction

To do: Calculate the bulk molecular weight of the natural gas. **Solution**:

First, I used the on-line periodic table to find the molecular weights of each component molecule:

- Carbon, C, M = 12.0107 g/mol
- Hydrogen, H, M = 1.00794 g/mol