**Introduction**

Mixed Matrix Membranes (MMMs)
- Combination of Continuous Organic Polymer Phase and Porous Additive
  - Utilizes the ease of processing polymers
  - Benefits from improved gas separation performance of diverse porous filler materials
- Potential for Enhanced Separation Quality:
  - Higher gas permeance may be observed with increased loading of the porous filler. (Nuhnen, 2021)
- Components:
  - Polymer Phase: Pebax 1657
  - Filler: ACOF-1; Covalent Organic Framework (COF)

**MMMs Synthesis**

- Pebax 1657/ACOF-1 + EtOH/H2O
- Casting solution stirring and sonication
- Mixture casting in a petri dish
- Solvent evaporation in an oven

**Gas Permeance Setup; CO₂ Permeation (ppm)**
- In testing the permeance and performance of the synthesized MMMs, we employed an in-house-built permeation setup

**Conclusion; CO₂ Permeation (Barrer Units)**
- MMMs have the potential for increasing the CO₂ permeance as compared to typical polymers:
  - Significant increase with higher ACOF-1 loading
- The in-house built gas permeance cell and the MMMs show reliable data.
  - Sensible CO₂ parts per million (PPM) data
  - Absence of erratic peaks

**Future Work**
- Test for Selectivity:
  - Experiment with gas mixtures such as CO₂/CH₄ to assess the selectivity of the material towards specific gases
  - Increase ACOF-1 Loading to assess the impact on permeance and selectivity
  - Experiments to test if the sonication impacted the chemical composition of the casting solution.

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**GAS PERMEATION STUDIES OF THE COVALENT ORGANIC FRAMEWORKS (COFs) BASED MIXED MATRIX MEMBRANES (MMMs)**

Dhruv Tomar, Chemical Engineering

**Proposed Gas Permeance Setup For Testing Selectivity**

**Proposed Gas Permeance Setup For Testing Selectivity**

- In testing the permeance and performance of the synthesized MMMs, we employed an in-house-built permeation setup

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(Images and diagrams not provided in the text representation.)