

II. Introduction: Partial molar volume is the contribution that a component of a mixture makes to the overall volume of the solution. The component also tells how the total volume of the solution would change if the number of moles in the solution changes.

$$V_1 = (\partial V / \partial n_1)_{P,T} \quad \text{or} \quad V = n_1 V_1 + n_2 V_2 + n_3 V_3 \dots n_k V_k \text{ (for binary solutions)}$$

A pycnometer or a specific gravity bottle is a flask with a stopper that has a capillary tube that allows air bubbles to escape and it's used to obtain accurate measurements of density.

III. Materials	Chemical Properties	Safety Precautions
1) 1-propanol (CH ₃ CH ₂ CH ₂ OH)	- colorless liquid -BP: 97.2°C FP: -126.6°C - soluble in cold water, weight: 60.1g/mole	- Flush skin and eyes with plenty water - Remove to fresh air. Don't induce vomit -Flammable
2) water (H ₂ O)	-BP: 100°C; colorless liquid - weight: 18.02g/mole	-N/A; non-flammable
3) pycnometer	4) beakers	

IV. Procedure

A. How to use a pycnometer:

1. Carefully clean the glassware with soap and water and then rinse with a small amount of acetone as described above.
2. Weigh the dry flask and stopper on the analytical balance in the balance room.
3. Determine the exact volume of your pycnometer by filling it fully with water, inserting the stopper, and tapping the sides gently to remove the air bubbles.
4. Dry the sides and weigh the full pycnometer on the analytical balance. Measure the temperature of the water. Use the known density of water located in the CRC handbook to determine the volume of water contained in the full pycnometer flask.
5. Be certain to use the known density value at the correct temperature.
6. Do the same for the procedure in the liquid unknown. Calculate the density of the unknowns.

B. Experiment

- 1) Equilibrate the solutions at constant temperature both before weighing them. (since density varies with temperature) (use temperature from the literature data)
- 2) Do 2 trials for at least 5 compositions (5 different concentrations of your aqueous solution)

V. Raw Data

Concentrations	Trial 1	Trial 2