

# Chem 145, Lecture Problems

## Density

Density:

At an altitude of 40 km the density of air is 4.3 gm/m<sup>3</sup>. What is the mass of 537 m<sup>3</sup> of air at this altitude.

$$\text{density} := 4.3 \cdot \text{gm} \cdot \text{m}^{-3} \quad (\text{note: the unit grams is abbreviated gm in Mathcad})$$

$$\text{volume} := 537 \cdot \text{m}^3$$

Equation from the book:

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

For this problem we want to find the mass, so the above rearranges to:

$$\text{mass} := \text{density} \cdot \text{volume}$$

$$\text{mass} = 2.309 \cdot 10^3 \cdot \text{gm}$$

Take a look at this answer and think about if it is reasonable?

At an altitude of 10 km the same mass of air from above has a volume of only 5.433 m<sup>3</sup>. What is the density of this air?

We know the following from the wording of the question and the answer above

$$\text{volume} := 5.433 \cdot \text{m}^3$$

$$\text{mass} = 2.309 \cdot 10^3 \cdot \text{gm}$$

The equation for density, mass, and volume (already in the right arrangement).

$$\text{density} := \frac{\text{mass}}{\text{volume}}$$

$$\text{density} = 425.014 \cdot \text{gm} \cdot \text{m}^{-3}$$

Take a look at this answer and think about if it is reasonable?