

Today, we will:

- Discuss *relative humidity* (water vapor in air), and do some example problems
- Begin discussing the classification of air pollutants (CAPS, HAPS, NAAQS, etc.)

Relative Humidity (deals with the amount of water vapor in the air)

Example: Relative Humidity

Given: A hot summer day:

- $T = 95.0^{\circ}\text{F}$ (35.0°C)
- $P = 99.6 \text{ kPa}$
- $RH = 90.0\%$ (90% relative humidity)

To do: Calculate the mol fraction of water vapor in the air (in units of PPM).

Solution:

Example: Relative humidity

Given: The same hot summer day as in the previous example:

- $T = 95.0^{\circ}\text{F}$ (35.0°C)
- $P = 99.6 \text{ kPa}$
- $RH = 90.0\%$ (90% relative humidity)
- Now the temperature drops rapidly to 86.0°F (30.0°C)
- At the same time, the pressure drops to 98.5 kPa

To do: Calculate the new relative humidity of water vapor in the air and discuss.

Solution:

- Look up saturation pressure of water in thermo table at 30.0°C . $P_{v, \text{H}_2\text{O}} = 4.246 \text{ kPa}$.

Example: Partial pressure of a volatile liquid

Given: A half-full can of liquid benzene sits in a storage can for several days at $T = 20^\circ\text{C}$ and at atmospheric pressure ($P = 101.325 \text{ kPa} = 760 \text{ mm Hg}$).

To do: Calculate the mass fraction of benzene in the air in the can as a percentage.

Solution: