

# Chem 31

# Fall 2002

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## Chapter 10

### *Gases*

## Gases

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- One of the four states of matter
- Simplest to understand both *physically* and *chemically*
- **Gas Properties**
  - ✓ Low density
  - ✓ *Fluid*
  - ✓ Can be defined by their:
    1. Pressure (P)
    2. Volume (V)
    3. Temperature (T)

# Pressure

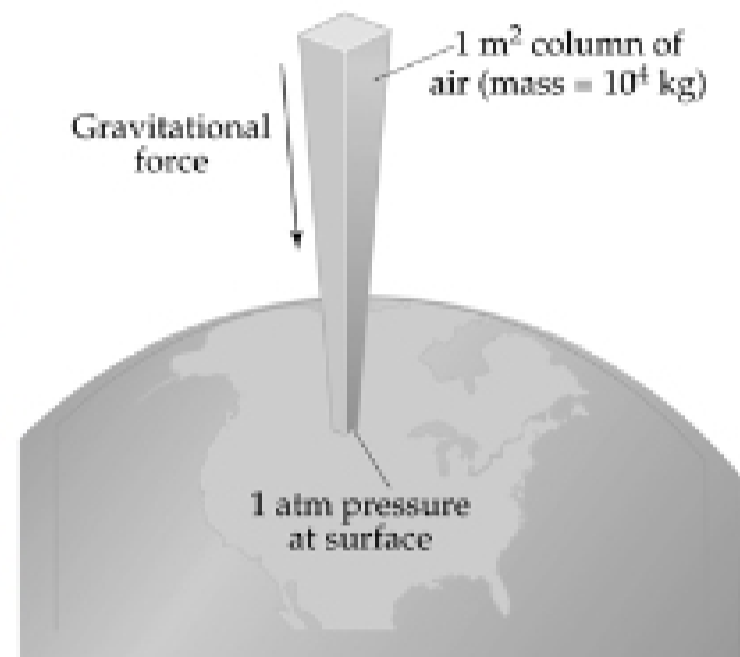
## ■ How do we measure/quantify pressure?

Define:  $P = \text{force/area}$   
 $= \text{N/m}^2$   
 $= \text{Pascals (Pa)}$

### Atmospheric Pressure:

- force exerted by the atmosphere on the surface of the Earth

$$P = 1 \text{ atm} = 101,325 \text{ Pa}$$

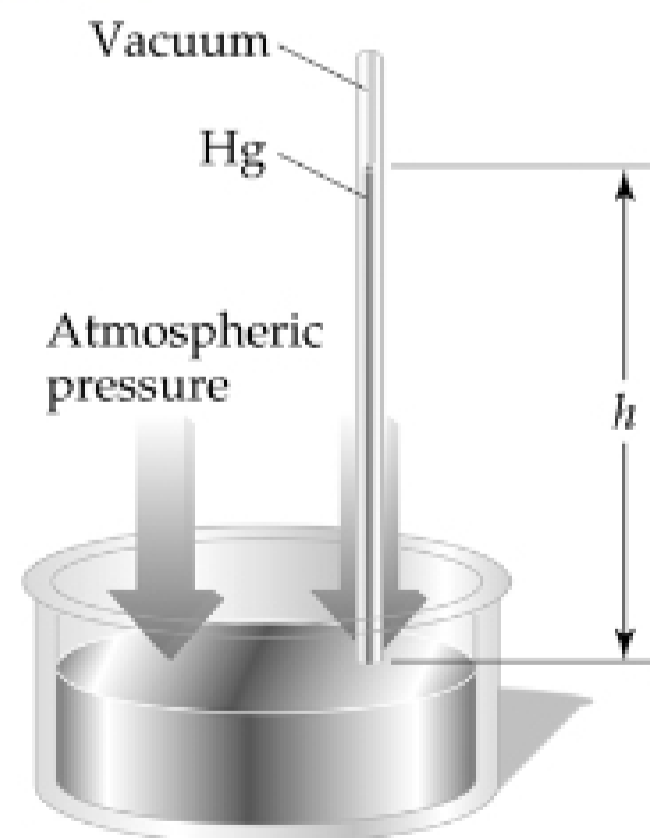


# Measuring Pressure

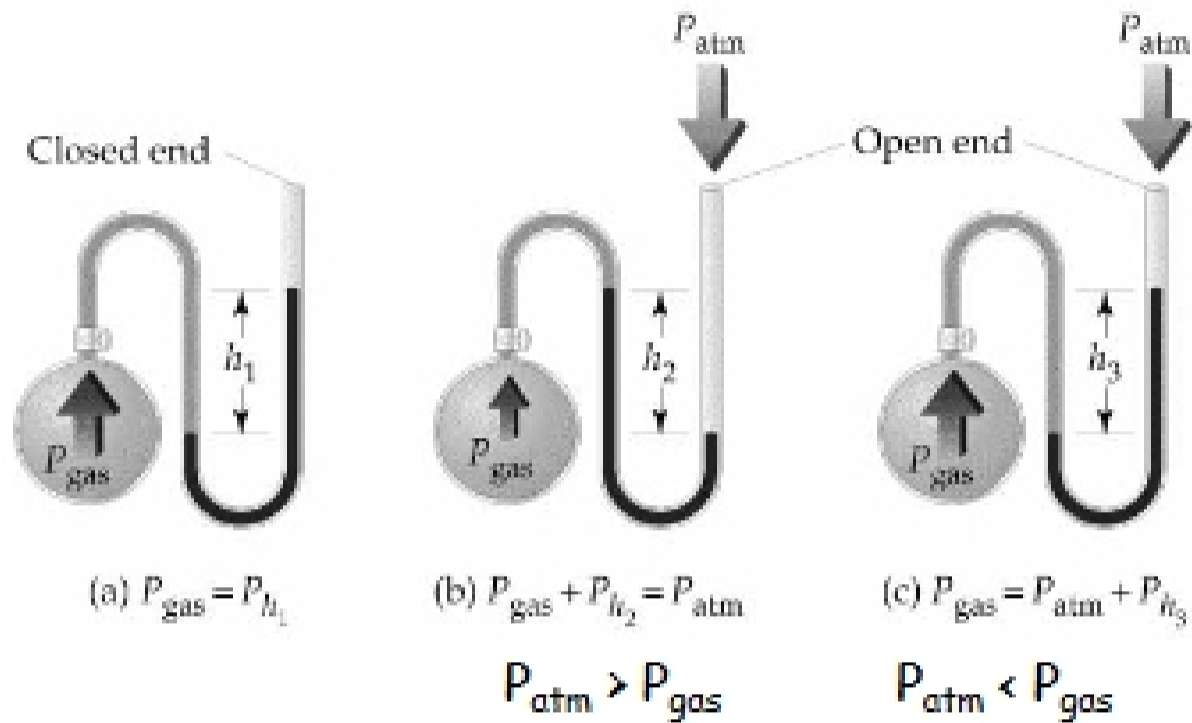
## ■ Torricelli (1600's):

- atmospheric pressure raises a column of mercury 760 mm
- *Barometer*

$$\begin{aligned} 1 \text{ atm} &= 760 \text{ mm Hg} \\ &= 760 \text{ torr} \\ &= 101,325 \text{ Pa} \\ &= 101.325 \text{ kPa} \end{aligned}$$



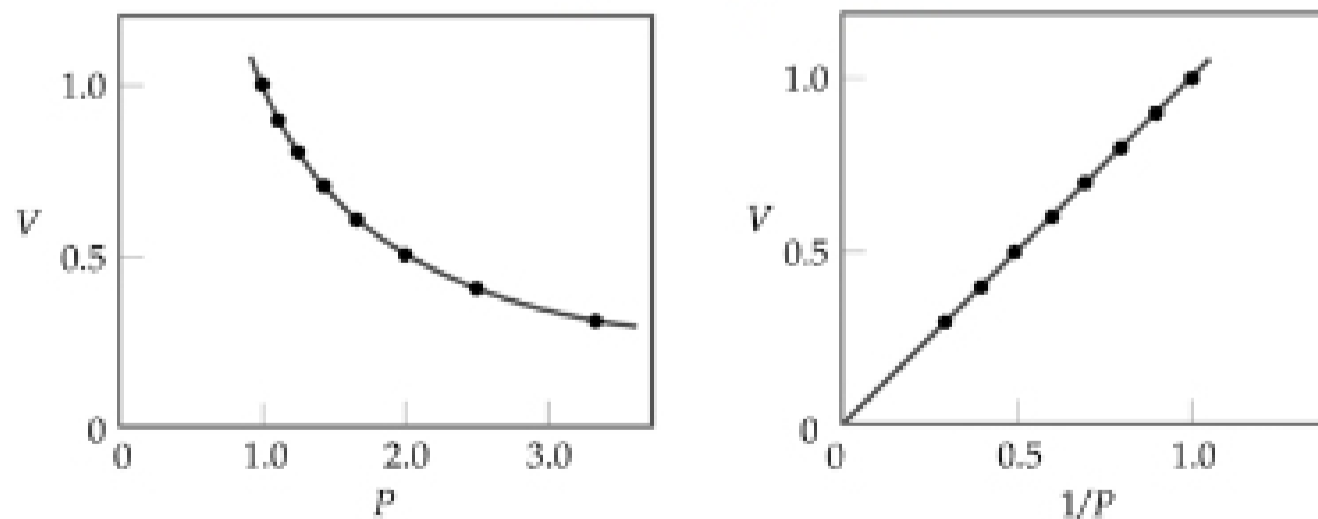
# Manometer



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# Boyle's Law: Pressure-Volume

- Changing *pressure* on a fixed amount of gas resulted in a corresponding change in **volume**:



Boyle found that:  $P \times V = \text{constant}$

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