

Chapter 5

Gases -1

Gas Properties and Pressure

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Properties of Gases

1. They are compressible.
2. They expand to fill the container.
3. Pressure, volume, temperature, and amount are related.
4. They have low density.
5. Form a homogeneous mixture.

Kinetic Molecular Theory

A theory, developed by physicists, that is based on the assumption that a gas consists of molecules in constant random motion.

Postulates of the Kinetic Theory

1. Gases are composed of molecules whose sizes are negligible.
2. Molecules move randomly in straight lines in all directions and at various speeds.
3. The forces of attraction or repulsion between two molecules (intermolecular forces) in a gas are very weak or negligible, except when the molecules collide.
4. When molecules collide with each other, the collisions are elastic.
5. The average kinetic energy of a molecule is proportional to the absolute temperature.

Pressure

Pressure is force exerted per unit area. $P = \text{Force}/\text{Area}$

The SI unit for pressure is the pascal, Pa.

Other Units

atmosphere, atm

mmHg

torr

bar

$$1 \text{ Pa} = 1 \text{ N/m}^2$$



1 atm*

101,325 Pa

760 mmHg*

760 torr*

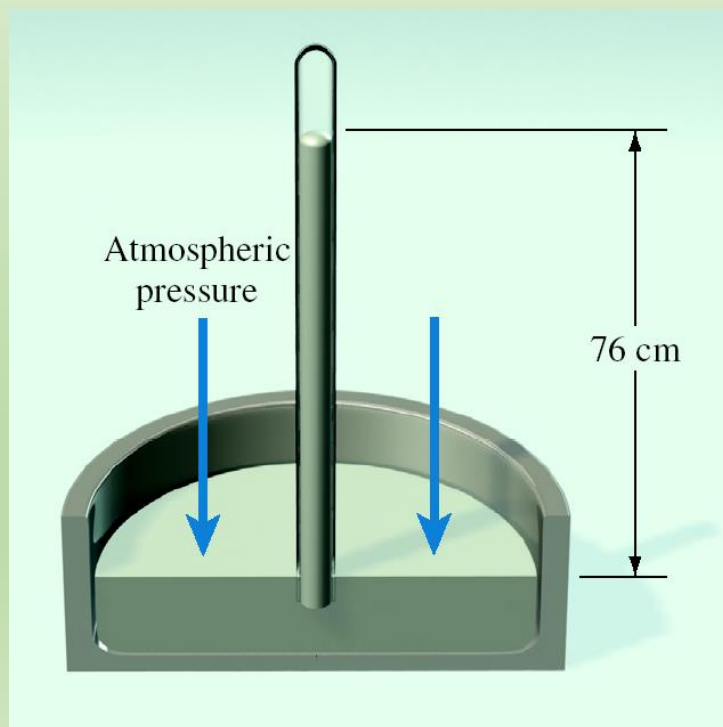
1.01325 bar

14.7 psi

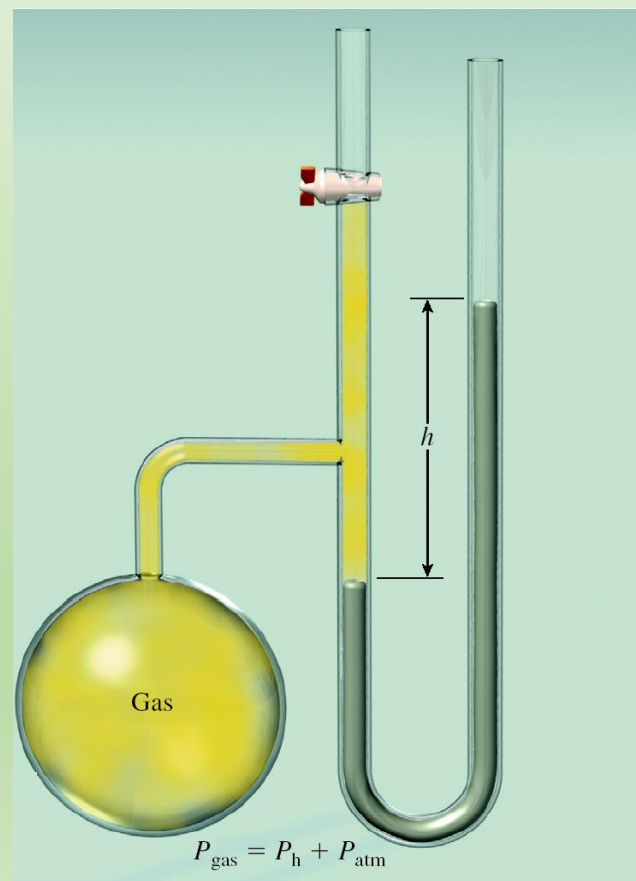
*These are exact numbers.

Measurement of Pressure

A **barometer** is a device for measuring the pressure of the atmosphere.



A **manometer** is a device for measuring the pressure of a gas or liquid in a vessel.



Key Points

- Properties of gases
- The kinetic molecular theory
- Gas pressure
 - Units
 - Calculation
 - Measurement