

Gases Introduction

Kinetic Theory of Gases ... Postulates (p. 426)

1. Gases consist of tiny particles (atoms or molecules). True
2. These particles are so small compared with the distances between them that the volume (size) of the individual particles can be assumed to be negligible (zero). True
3. The particles are in constant random motion, colliding with the walls of the container. These collisions with the walls cause the pressure exerted by the gas. True
4. The particles are assumed not to attract or to repel each other. True
5. The average kinetic energy of the gas particles is directly proportional to the Kelvin temperature of the gas. True

Variables ... what can we change that effects a gas?

1. Pressure
2. Volume
3. Temperature
4. Amount

Pressure ...

1. What causes pressure?

→ collisions of particles with walls of container

2. Increased pressure is due to

more collisions

Units of Pressure ...

1. The barometer is a device used to measure pressure.
2. At sea level, the atmosphere will support a tube of mercury 760 mmHg long that is inverted into a dish of mercury.
What will happen at higher altitudes? Lower?
3. Additional units used to measure pressure include ...
 - a. 1 atm = 760 ~~760~~ mmHg
 - b. 1 atm = 760 torr (in honor of Torricelli)
 - c. 1 atm = 14.7 pounds/sq. inch (psi)
 - d. 1 atm = 101.3 ~~101.3~~ pascals (Pa)
 - e. 761 atm = 101.3 kPa

$$1 \text{ atm} = 760 \text{ mmHg} = 760 \text{ torr} = 14.7 \text{ psi} = 101,325 \text{ Pa} = 101.3 \text{ kPa}$$

Sample Problems: Use D.A.!!! to solve each!

1. $1.25 \text{ atm} = \underline{950.} \text{ mmHg}$

$$\frac{1.25 \text{ atm}}{1 \text{ atm}} \times \frac{760 \text{ mmHg}}{1} =$$

2. $10.6 \text{ psi} = \underline{.721} \text{ atm}$

$$\frac{10.6 \text{ psi}}{14.7 \text{ psi}} \times \frac{1 \text{ atm}}{1} =$$

3. $0.234 \text{ kPa} = \underline{234} \text{ Pa} = \underline{1.76} \text{ torr}$

$$\frac{0.234 \text{ kPa}}{101.3 \text{ kPa}} \times \frac{101,325 \text{ Pa}}{1} = 234 \text{ Pa}$$

$$\frac{234 \text{ Pa}}{101,325 \text{ Pa}} \times \frac{760 \text{ torr}}{1} =$$

4. $825 \text{ mmHg} = \underline{110,000} \text{ Pa}$

$$\frac{825 \text{ mmHg}}{760 \text{ mmHg}} \times \frac{101,325 \text{ Pa}}{1} =$$

5. $752 \text{ torr} = \underline{14.5} \text{ psi}$

$$\frac{752 \text{ torr}}{760 \text{ torr}} \times \frac{14.7 \text{ psi}}{1} =$$