Fast Facts About Gasses

Elements that exist in gaseous form (at “room temperature”):

H

N

O

F

Cl

He

Ne

Ar

Kr

Xe

Rn

Gases that exist as diatomic molecules:

H2, N2, O2, F2, Cl2 (O3 is also gaseous at room temperature)

Nobel gases (Group 8A) are chemically inert – they cannot combine with any other element\*

\*Party trivia! Amaze your friends! At close to absolute zero (-273.15 °C) Helium can form as He2

***Most*** gases are colorless; exceptions are F2, Cl2 and NO2.

***All* gases** have the following physical characteristics:

* Gases assume the volume and shape of their containers
* Gases are the most compressible of the states of matter
* Gases will mix evenly and completely when confined to the same container
* Gases have much lower densities than solids or liquids

**Pressure of a Gas**

Gases exert pressure on any surface with which they come in contact because gas molecules are constantly in motion.

An example of atmospheric pressure (gas pressure on a surface) is liquid through a straw:

Sucking on the straw reduces the pressure inside the straw and increases the pressure on the outside of the straw.

**Atmospheric Pressure**

**Atmospheric pressure** isthe pressure exerted by the Earth’s atmosphere.

Gases, like solids and liquids, are subject to the Earth’s gravitational pull. Because of this, gases exert more pressure closer to sea level than they do in the atmosphere (thus the term “thinner air”).

Density of air decreases very rapidly with increasing distance from the earth.

MORE PARTY TRIVIA! About 50% of the Earth’s atmosphere lies within 6.4 km of the Earth’s surface; 90% is within 16 km; and 99% within 32 km.

A **Barometer** is an instrument used to measure atmospheric pressure. A simple barometer consists of a long glass tube, closed at one end and filled with mercury.

How a Barometer Works:

A glass tube filled with Hg is carefully inserted into a dish of Hg, so no air enters the tube. Some mercury will flow out of the tube and into the dish. This will create a vacuum at the top of the tube. The weight of the Hg remaining in the tube is supported by ***atmospheric pressure*** acting on the surface of the Hg in the dish.

***Standard Atmospheric Pressure (1 atm)*** *– the pressure that supports a column of mercury exactly 760 mm (76 cm) high at 0○C at sea level. (or 1 mmHg – which is also equal to 1 torr)*

The actual value of atmospheric pressure depends on location, temperature, and weather conditions.

Some units of atmospheric pressure:

1 torr = 1 mmHg

1 atm = 760 mmHg or 760 torr

The relationship between atmospheres and pascals is1 atm = 101,325 Pa or simply

1 atm= 1.01325 x 105 Pa or
1 atm = 1.01325 x 102 kPa (Kilopascals)

**How to convert from mmHg to atm to kPa:**

EXAMPLE 1:

What is the pressure in the atmospheres in a plane cabin if the barometer reading is 688 mmHg?

Pressure = 688 mmHg x (1atm/760 mmHg) = .905 atm

The air is too thin!! The cabin must be pressurized!

Remember that standard atmospheric pressure is 1 atm!

EXAMPLE 2

If atmospheric pressure is 732 mmHg, what is the pressure in kPa?

Remember that 1 atm = 1.01325 x 102 kPa = 760 mmHg

732 mmHg x (1 atm/760 mmHg) = .96315 atm x( 1.01325 x 102 kPa ) = 97.6 kPa

Example 2: Convert 295 mmHg to kPa

295 mmHg x (1 atm/760 mmHg) = .388 atm x (1 atm/1.01325 x 102 kPa) = 39.3 kPa