Gas Pressure http://ed.ted.com/lessons/how-heavy-is-air-dan-quinn

Pressure – force exerted on an area

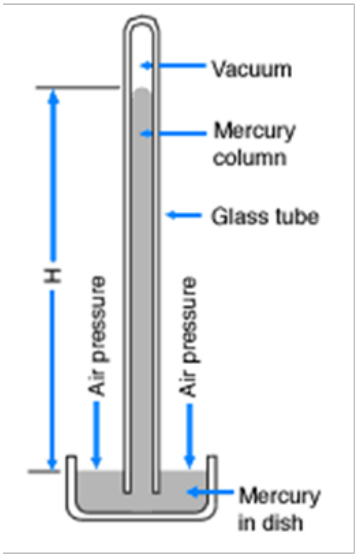
3 main unit of pressure

- Pa = pascals
  1000 Pa = 1 kPa
- atm = atmospheres
- mm Hg = millimeters of mercury
  mm Hg is equal to a unit called the torr
  1 mm Hg = 1 torr

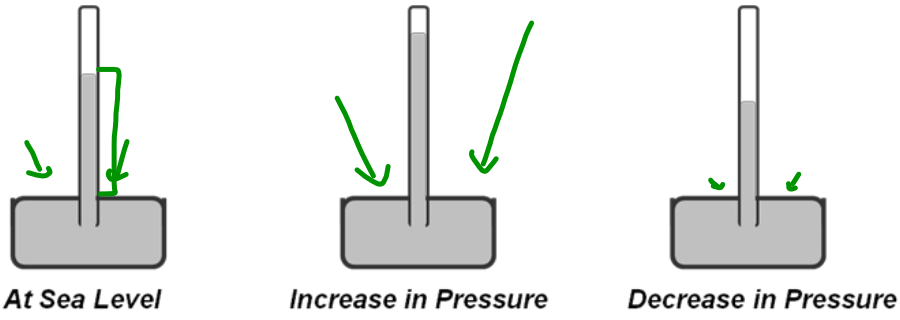
http://ed.ted.com/lessons/the-history-of-the-barometer-and-how-it-works-asaf-bar-yosef

mm of Hg

- Evangelista Torricelli accidentally discovered a way to measure atmospheric pressure.
- He had setup a glass tube filled with mercury inverted in a tub of mercury
- If gas pressure changed, the amount of mercury in the glass tube changed.



1atm = 760mm Hg



Converting Between Units of Pressure

101.325 kPa = 1 atm

760 mm Hg = 1 atm

760 mm Hg = 101.325 kPa

To convert between units it is a simple matter of cross multiplying and dividing

Ex. Convert 745.0 mm Hg into kPa

$$745.0\ mm\ Hg \times \left[\frac{101.325\ kPa}{760\ mm\ Hg}\right] = 99.33\ kPa$$

Try These:

99.0 kPa = 743 mm Hg

$$99.0\ kPa \times \left[\frac{760\ mm\ Hg}{101.325\ kPa}\right]$$

700 mm Hg = 93.3 kPa

$$700\ mm\ Hg \times \left[\frac{101.325\ kPa}{760\ mm\ Hg}\right]$$

720 mm Hg = 0.947 atm

$$720\ mm\ Hg \times \left[\frac{1\ atm}{760\ mm\ Hg}\right]$$

1.43 atm = 145 kPa

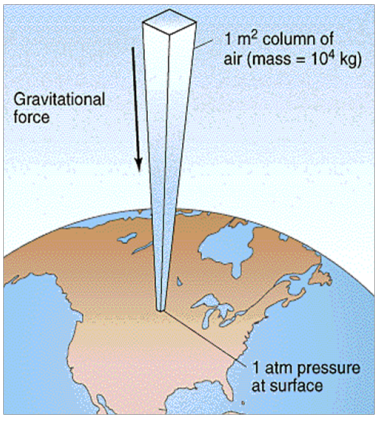
$$1.43\ atm \times \left[\frac{101.325\ kPa}{1\ atm}\right]$$

Atmospheric pressure – force exerted by the mass of air above a certain point

Low pressure areas have less atmospheric mass above their location

High pressure areas have more atmospheric mass above their location

as elevation increases, there is less overlying atmospheric mass, so that pressure decreases with increasing elevation



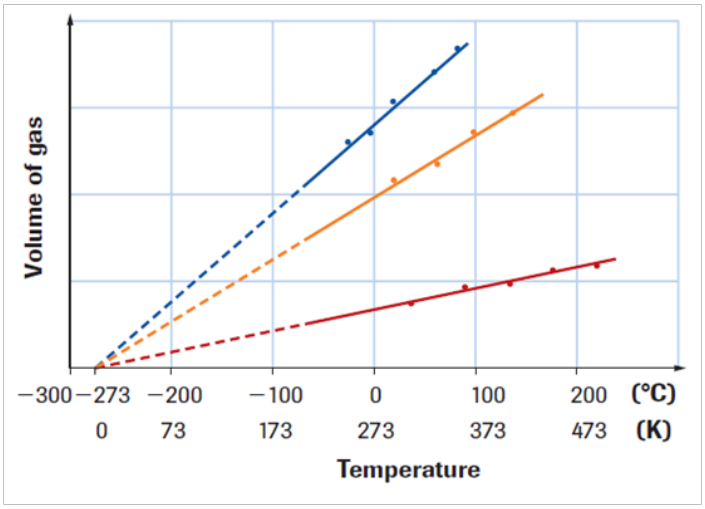
Temperature Conversions

- Kelvin scale also called absolute temp scale

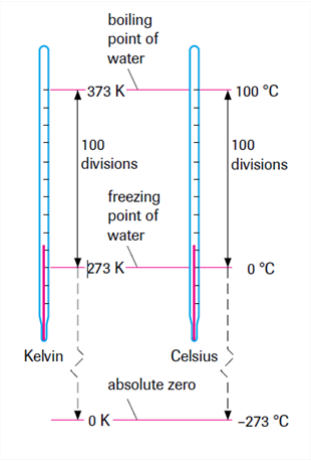
  - Absolute zero or 0 K is equal to -273°C

- This is the lowest possible temperature

- The temp at which all particle motion stops



K = °C + 273 **°C = K - 273**



Try These:

10.0 °C = 283.0 K 373 K = 100 °C 25°C = 298 K

Practice Sheet 1

Abbreviations	Conversions
atm - atmosphere mm Hg – millimetres of mercury torr – same as mm Hg	1 atm = 101.325 kPa = 760 mm Hg = 760 torr

Use cross multiplying and dividing to find out the required units

1. **Convert the following pressures to kilopascals:**

a. 700 mm Hg

$700\ mm\ Hg \times \left[\frac{101.325\ kPa}{760\ mm\ Hg}\right] = 93.3\ kPa$

b. 850 mm Hg

113 kPa

e. 1.20 atm

122 kPa

$1.20\ atm \times \left[\frac{101.325\ kPa}{1\ atm}\right]$

f. 3.45 atm

350 kPa

2. **Convert the following pressures to mm Hg:**

a. 100 kPa

$100\ kPa \times \left[\frac{760\ mm\ Hg}{101.325\ kPa}\right] = 750\ mm\ Hg$

b. 75.0 kPa

563 mm Hg

e. 150 torr

150 mm Hg

f. 2.3 atm

$1.7 \times 10^3\ mm\ Hg$

3. **Convert the following pressures to atm:**

a. 850 mm Hg

1.12 atm

b. 75 kPa

0.74 atm

e. 300 kPa

2.96 atm

f. 545 mm Hg

0.717 atm

4. Convert the following temperatures:

a. 45.5 °C = 318.5 K

45.5 + 273

b. 755 K = 482 °C

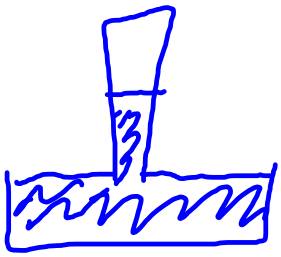
755 - 273

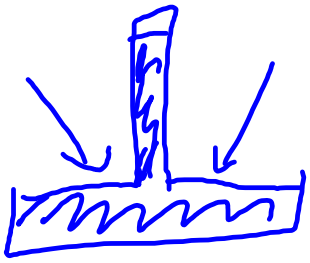
c. 73.5 K = -199.5 °C

d. 100 °C = 373 K

If you measured the air pressure in Vancouver and then again at the top of Mount Everest, would there be a difference in air pressure? Why or why not?

Assume that the atmospheric pressure increases from 750 mm Hg to 765 mm Hg. Sketch the initial and final views of a mercury barometer.





Imagine that you had two aerosol cans, both filled with the same amounts of the same gas. You heat one of the cans up, while keeping the other at room temperature. Will both cans have the same gas pressure? Why or why not? Explain your answer!

Imagine that you are pushing down the plunger of a syringe. However, the syringe is plugged (no air can escape). When you push down with the plunger, you are compressing the gas in the syringe. What happens to the gas pressure when you do this? Explain your answer!