

# Charles' Law Encyclopedia Article

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# Charles' Law

One of the **gas laws**, Charles' law states that at a constant **pressure** the volume of a fixed **mass** of gas is directly proportional to the absolute **temperature**. This law also can be expressed by the equation  $V/T = \text{constant}$  where  $V$  is the volume of the gas and  $T$  is the temperature in Kelvin.

Charles' law also is known as **Gay-Lussac's law** and the constant pressure law. This law was discovered independently by French physicist Jacques Charles (1746-1823) in 1787 (who did not publish his findings) and French chemist Joseph Gay-Lussac (1778-1850) in 1802. Although Gay-Lussac was the first scientist to announce this law, it is commonly known as Charles' law for its earlier discoverer. Charles' law can be combined with **Boyle's law** and the pressure law to give the **ideal gas law** (also known as the universal gas law),  $pV = nRT$ , where  $p$  is pressure,  $V$  is volume,  $n$  is the number of moles of gas,  $R$  is the universal gas constant, and  $T$  is temperature.

Charles' law is one of the ways in which **absolute zero** is calculated. This is done by extrapolating a graph of volume against temperature. At the point on the graph where the volume of the gas is zero (gas cannot have a volume less than zero), the theoretical temperature is absolute zero, the coldest temperature possible. This point has never actually been achieved, since gases liquefy before they reach this temperature and they are no longer subject to the gas laws.

Charles' law is a good indicator of what happens to a gas, since the volume and temperature are altered while the pressure remains constant.