Gay-Lussac's Law Encyclopedia Article

Gay-Lussac's Law

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Gay-Lussac's Law

By the late 1600s, scientists had learned that **heat** would make gases expand in volume, and British chemist **Robert Boyle** had begun to explain the relationship between the volume, **pressure**, and **temperature** of gases. He summarized his ideas in an expression, known as Boyle's law, which states that the volume of a given amount of a gas varies inversely with pressure. This principle is important since chemistry often involves the study of gases that are hard to measure because they expand to fill whatever container they are in. The value of **Boyle's law** lies in its ability to calculate a gas's volume at a standard pressure without actually having to measure the volume at that pressure.

It was more than a century later, however, until French chemist Joseph Gay-Lussac discovered, with a series of careful experiments, that different gases all expand in volume by the same amount with the same rise in temperature. Although he was the first to announce this principle, in 1802, today it is more commonly known as **Charles's law** after French chemist Jacques Charles, who actually had the same idea earlier but did not publish his findings before Gay-Lussac.

Further, Gay-Lussac found that gases combine with each other in simple proportions--for example, two parts of hydrogen by volume react with one part **oxygen** to form water. This important elaboration came to be known as *Gay-Lussac's law of combining volumes*. These fundamental concepts were crucial to Amedeo Avogadro's discovery a few years later that equal volumes of gases at the same temperature and pressure contain the same number of molecules. Although Gay-Lussac's laws strictly apply only to certain theoretical gases (called "ideal"), many simple substances that are gases at room temperature and normal air pressure do behave as if they were ideal gases. Thus, the laws have proved extremely useful in explaining the behavior of gases, and they are considered fundamental concepts in chemistry and physics.