

# Topic Introduction



Summarize your understanding of each paragraph.

**The Ideal Gas Law:** This combines concepts from Boyle's law, Charles' law, and Avogadro's law. Four variables (P, V, n, and T) are inter-related. Knowledge of the value for any combination of three of these is enough to determine the remaining value.

**Dalton's Law of Partial Pressures:** Air is a mixture of components (including N<sub>2</sub>, O<sub>2</sub>, and CO<sub>2</sub> for example). Studies of gaseous mixtures show that each component behaves independently of the others.

**Gas Stoichiometry:** Because  $n = PV/RT$  scientists and students can calculate the number of moles present. This makes it possible to do stoichiometric calculations for reactions involving gas.

**Remember that  $R = 8.314 \text{ J/mol}$ .** The ideal gas law is:  $pV = nRT$ , where n is the number of moles, and R is universal gas constant. The value of R depends on the units involved, but is usually stated with S.I. units. Here we use  $R = 8.314 \text{ J/mol}$ .

# Read/Summarize Text

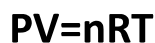


1. Read the passage.
2. Underline key expressions in each sentence.
3. Re-write each word (or expression) you underlined.
4. Summarize the passage.

## *About Gas Laws*

Gas laws are the physical laws that describe the properties of gases, including Boyle's and Charles' laws.

One of the gas laws chemistry students learn is the ideal gas law. It has four variables. The four gas variables are: pressure (P), volume (V), number of mole of gas (n), and temperature (T). The constant in the equation is R, known as the gas constant.



The ideal gas law is a good approximation for most gases under moderate pressure and temperature.

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## *Re-write words you underlined*

\_\_\_\_\_

\_\_\_\_\_

## *Using a complete sentence, summarize or rephrase the passage*

\_\_\_\_\_

# Read Text for Comprehension

Read this article for deeper understanding. No summary is required, although you may want to circle, underline, or mark key ideas and words.

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## **EXTRACT: A Brief History of the Study of Gas Chemistry.**

### **20<sup>th</sup> Century: Nuclear Chemistry**

If we were to greatly simplify the history of chemistry so that each century were defined by a single major field of discovery, the twentieth century would be remembered as the Century of Nuclear Chemistry during which our considerable understanding of the subject was developed from earlier theories.

### **19<sup>th</sup> Century: Organic Chemistry**

Then moving backwards in time, the nineteenth century would be remembered as the Century of Organic Chemistry during which period most of the concepts and principles of organic chemistry were discovered.

### **18<sup>th</sup> Century: Gas Chemistry**

The eighteenth century would be the Century of Gas Chemistry, marked by the discovery of most of the common gases. Ingenious techniques with which to generate, collect and study gases were invented at that time. Entire laboratories were dedicated to the study of the new discipline of '*pneumatics*'.

Their discoverers gave the gases names such as '*fixed air*', '*dephlogisticated air*', and '*inflammable air*'.

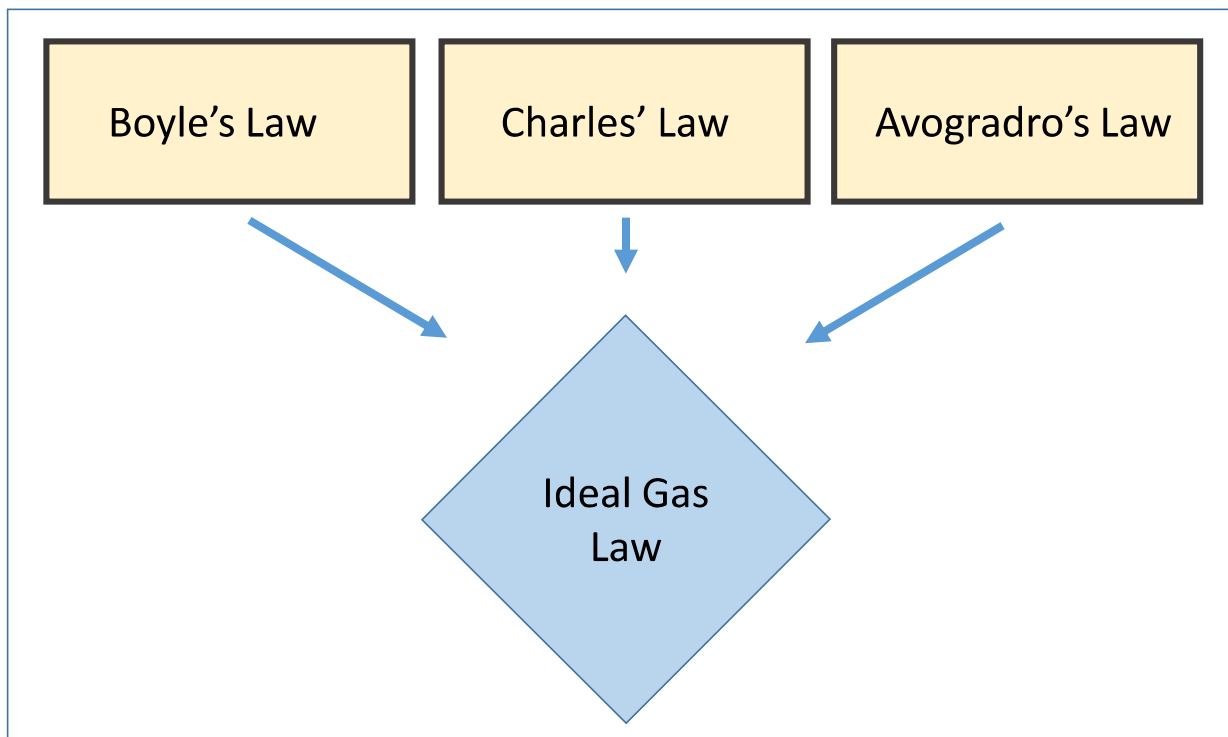
Despite these substantial laboratory accomplishments, the actual chemical identities of these gases remained complete mysteries until the very end of the century. The story of the early days of gas chemistry is interesting and important. It spans the entire century and serves as an example of how an erroneous theory can shape and misguide understanding and investigation. It is a story in which the chemical behavior of the gases eventually allowed the genius of one man, Antoine Lavoisier, to first postulate the precepts of modern chemistry as we know them even to this day.

***Investigation suggestion:*** *what did 18<sup>th</sup> Century scientists describe as fixed, dephlogisticated, and inflammable air?*

# Draw Illustration



Copy the Illustration (Ideal Gas Law) in space provided.



Recreated based on diagram appearing at <https://chem.libretexts.org>

**Draw (Copy) the Illustration Here**