History

Explore the discoverer's biography, including general facts about his life and anecdotes regarding how he made this particular discovery. Also see other significant scientific discoveries built largely on this concept and other real-world applications in history that may not still be relevant.

Discoverer/Developer

Gay-Lussac's Law from 1802. Joseph Louis Gay-Lussac (1778-1850) was a French professor who, in 1802, published the law of expansion of gases by heat. He worked closely with other scientists to publish other significant conclusions about gases and other facets of chemistry. He improved various chemical tools, such as the thermometer and the barometer. Gay-Lussac was among those at the center of scientific investigation in France, and France was the world leader in the scientific disciplines at the time. Gay-Lussac also made discoveries in the reactivity of gases, specifically in the formation of water and carbon dioxide, among others. It is seen that Guy-Lussac's work directly influenced the research of Amedeo Avogadro in the formation of Avogadro's Law.

Use/Application through History

Gay-Lussac's Law directly influenced the work of Amedeo Avogadro in the formation of his law. Gay-Lussac's Law was relied upon heavily by Berzelius in the formation of his Theory of Volumes. Gay-Lussac's Law contributed to the determination of the molecular formulae of water, hydrogen chloride, and ammonia. Interestingly, Dalton rejected the validity of Gay-Lussac's Law, even though he readily applied its implications. Gay-Lussac's Law can also be applied to osmosis, which, in turn, allows the determination of molecular weights by osmotic pressure.

Concept Definition

Study the primary definition of this concept, broken into general, basic, and advanced English definitions. Also see the mathematical definition and any requisite background information, such as conditions or previous definitions.

General Science

Pressure increases as temperature increases if volume remains constant. Pressure decreases as temperature decreases if volume remains constant.

Basic

Pressure and temperature of a gas at constant volume are directly proportionate.

Advanced

Pressure (P) and temperature (T) are directly proportionate for a constant volume.

Mathematical Definition

Background Information

Ideal Gas

An "ideal gas" is a gas in which:

- All collisions are totally elastic (particles always bounce off each other)
- There are no intermolecular attractions (a particle can only change direction when it collides with another particle)
- The molecule is infinitely small (particles will come all the way together before they collide)

What does this mean? An ideal gas is a collection of bouncy-balls.

Real World Application

Discover processes or disciplines in the natural or man-made worlds that employ the concept.

Bullets and cannons are based on these principles: gas super-heated by the burning of gun powder is trapped behind the bullet and expands until the bullet leaves the barrel.

Someone opening an oven may feel a quick flow of hot air; the air inside the oven is heated, therefore pressurized. The same is true when heating food in closed containers; often, a container will open to release the pressure. If it does not, opening the container will quickly release all the pent-up pressure, which can be very dangerous because the gases inside the hot container may be super-heated. This is why it is always best to open hot containers away from your body and face.

Vocabulary

Learn important vocabulary for this concept, including words that might appear in assessments (tests, quizzes, homework, etc.) that indicate the use of this concept.

Important Vocabulary **Term** **Context**

Constant Volume

- heats/cools with a constant volume

Isochoric

- gas in an isochoric process

Rigid Container

- gas inside a rigid container

Computer Animations

Experience computer simulators or animations that illustrate the concept discussed here. Many simulators or animations come with worksheets for use in class.

http://www.grc.nasa.gov/WWW/K-12/airplane/Animation/frglab2.html
http://www.walter-fendt.de/ph14e/gaslaw.htm
http://phet.colorado.edu/simulations/sims.php?sim=Gas_Properties
http://www.mhhe.com/physsci/chemistry/essentialchemistry/flash/gasesv6.swf
http://intro.chem.okstate.edu/1314F00/Laboratory/GLP.htm
http://preparatorychemistry.com/Bishop_animations.htm

Summary

Read a summary of the concept, indicating the enduring understanding students should retain after class.

Summary

If volume does not change, increasing the temperature of a container will increase its pressure. Decreasing the temperature of the container will decrease its pressure.

Works Cited

Review the works cited to write the researched parts of this page, such as the discover's biographical information and other areas.

Works Cited

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Ihde, Aaron J. *The Development of Modern Chemistry*. New York: Harper & Row, 1964.

Partington, J. R. *A Short History of Chemistry*. 2nd Ed. London: Macmillan and Co., 1948.

Wistrom, Cheryl. "The Gas Laws." Chemistry: Concepts and Applications. Teacher's wraparound ed. New York: Glencoe/McGraw-Hill, 2000. 382-392.

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