

Chemistry of Gases— Experiment Summaries and Concepts



Common Gases—Physical and Chemical Properties

Colorless, odorless, tasteless—the physical properties of many gases make them invisible to our senses. But that doesn't mean that all gases are the same. Just like solids and liquids, gases have characteristic physical and chemical properties. Which gases are lighter than air? Which gases are flammable? The purpose of this introductory-level experiment is to prepare five common gases and investigate their physical and chemical properties.

Preparing and Testing Hydrogen Gas—A Microscale Approach



Hydrogen is the second most abundant element in living things. Despite its abundance, very little hydrogen is found on Earth in its free state as hydrogen gas. This is because hydrogen combines readily with other elements. What properties of hydrogen gas make it unique? How can hydrogen gas be prepared in the lab? In this microscale experiment, students collect hydrogen gas by water displacement and study its density and combustion.

Oxygen, What a Flame—Microscale Gas Chemistry



Oxygen gas! Plants make it and we breathe it. Although we live in an atmosphere containing oxygen gas, the element is also a very reactive substance. The role of oxygen in combustion illustrates its great reactivity. The purpose of this experiment is to prepare oxygen gas and observe its characteristic oxidation–reduction and combustion reactions. Students learn a new and creative “gases in a syringe” method for generating gases that can be adapted to many different gases.

Carbon Dioxide, What a Gas—Microscale Gas Chemistry



Carbon dioxide gas is a product of respiration and combustion. We exhale it with every breath we take. If plants did not consume the excess carbon dioxide during photosynthesis, we would soon die from the toxic levels of carbon dioxide in the atmosphere. In this microscale experiment, students prepare carbon dioxide gas in a syringe and study its properties. Students learn about the acid–base properties of carbon dioxide as they perform classic tests to analyze this important gas.

Concepts

- Physical property
- Chemical property

- Hydrogen gas
- Physical properties
- Chemical properties
- Flammability

- Gas generation
- Oxygen gas
- Combustion
- Oxidation–reduction

- Preparation of gases
- Carbon dioxide gas
- Combustion
- Acid–base reactions