Chemical Concepts Demonstrated

- Volume changes of a gas due to cooling and heating

Demonstration

- Liquid nitrogen or dry-ice/acetone is poured over a balloon.

Observations

The volume of the balloon significantly decreases. When the balloon is removed from the liquid nitrogen, it regains its volume.

Explanations

A gas expands when heated and condenses when cooled. Charles' Law predicts a four-fold decrease in the volume of a gas that is cooled from room temperature to the temperature of liquid nitrogen (77 K). If the gas inside the balloon condenses into a volatile liquid at or around 77 K, the volume change will be even larger.

Removing the balloon exposes the cold balloon to higher temperatures. The resulting thermal expansion fills the balloon to its original size again.

Contributors

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