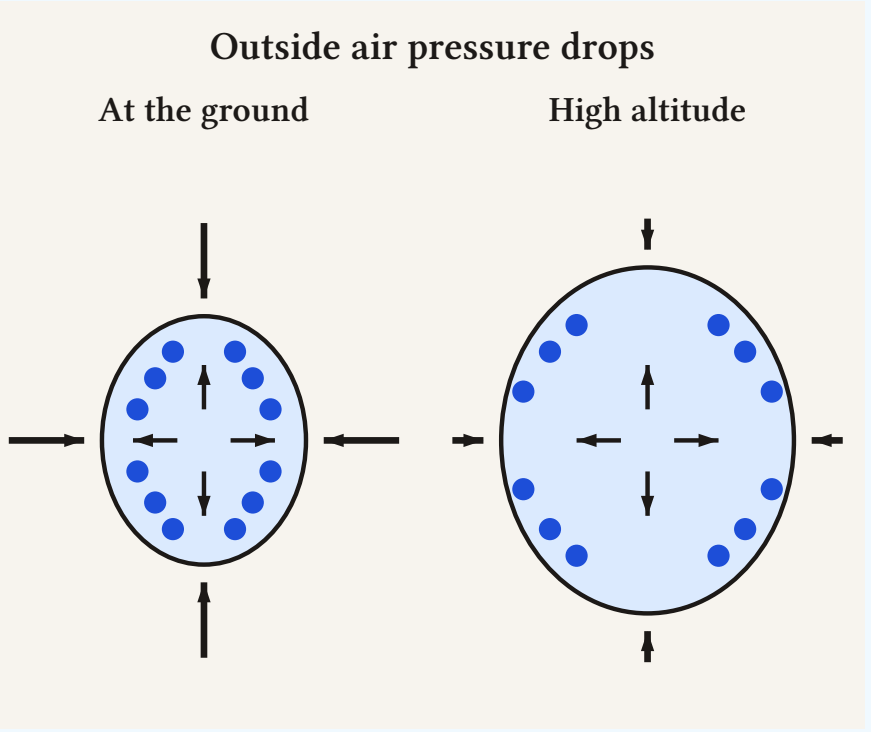
Chemistry 20

Unit B: Gases and the gas laws

Real gases and the ideal gas model

One balloon, two altitudes

- The balloon grows because the outside air pressure drops, while the gas inside keeps pushing out.
- Outside arrows point in, long at the ground and short at altitude. Inside arrows point out and stay the same length.



Three rules build the ideal picture

- An ideal gas uses negligible particle volume, elastic collisions, and no attractive forces.
- A real gas keeps the same moving particles, and its volume and attractions show up at high pressure and low temperature.

Key terms

kinetic molecular theory

A model that explains gas pressure and temperature through the motion and collisions of tiny particles. (KMT)

ideal gas

A gas model in which particle volume is negligible, collisions are elastic, and particles have no attractive forces.

real gas

A gas whose particle volume and attractive forces change the measurements at high pressure or low temperature.

Altitude keeps helium near the ideal picture

- Helium in the weather balloon is far above its condensation temperature, and the pressure on its skin is low.
- The larger volume in thin air follows from a lower outside pressure acting on the same moving particles.



Balloon and cold cylinder

- Helium at ordinary weather-balloon pressures matches the ideal gas rules.
- Carbon dioxide that is cold and highly compressed needs the real-gas corrections.

Nitrogen in two conditions

- Nitrogen in open room air is warm relative to its boiling point and is only lightly compressed.
- Nitrogen squeezed and cooled toward the liquid needs the real-gas picture.

Which picture fits

- Explain the weather balloon at low altitude and in thin air with one ideal-gas story.
- Name the conditions that make particle volume and attractions matter for a real gas.

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