

Applications of the Gas Laws

Reaction in car engine

In a car engine, a reaction occurs in which fewer moles of gasoline and O_2 form more moles of CO_2 and H_2O vapor, and heat is released. The increase in n (Avogadro's law) and T (Charles's law) increases V , and the piston is pushed back.

Dynamite is a solid that forms more moles of hot gases very rapidly when it reacts (Avogadro's and Charles's laws).

Bread baking

Dough rises because yeast digests sugar, which creates bubbles of CO_2 (Avogadro's law); the dough expands more as the bread bakes in a hot oven (Charles's law).

Breathing

When you inhale, muscles move your diaphragm down and your rib cage out (*blue*). This coordinated movement **increases** the **volume** of your lungs, which **decreases** the air **pressure** inside them (Boyle's law). The inside pressure is 1–3 torr *less* than atmospheric pressure, so air rushes in.

The greater amount of air stretches the elastic tissue of the lungs and expands the volume further (Avogadro's law).

The air also expands as it warms from the external temperature to your body temperature (Charles's law). When you exhale, the diaphragm moves up and the rib cage moves in, so your lung volume decreases (*red*).

The inside pressure becomes 1–3 torr *more* than the outside pressure (Boyle's law), so air rushes out.

