

Changing gas pressure

Dr George Dransfield: Gas pressure changes as volume changes.

This partially inflated balloon contains a fixed amount of air.

And this syringe is removing air from inside the bell jar.

This reduces pressure on the outside of the balloon, causing the balloon to expand.

On this graph, we can see that pressure and volume are inversely proportional.

That means if the volume of a gas doubles, its pressure halves for a fixed amount of gas at a constant temperature.

This can be represented by the equation

Pressure (p) times Volume (v) equals constant.

To understand this relationship, you need to know that gases are made of constantly moving particles.

Here are the particles inside the balloon and between the balloon and the bell jar.

Pressure is the force per unit area of these particles colliding with the walls of their container, like the balloon in our demonstration.

When we syringe air out of the bell jar, the external pressure on the balloon decreases.

This means that the pressure inside the balloon is greater than outside, so the air particles inside the balloon can push the balloon's walls outward, increasing its volume.

The number of air particles in the balloon remains the same, but with more space to move, they collide with the balloon's inner walls less often so the pressure inside the balloon drops.

This is the inverse relationship in action.

It continues until the gas inside the balloon reaches the same pressure as the gas outside.

And remember, for a fixed mass of gas at a constant temperature, if you halve the pressure, you double the volume and vice versa.

(MUSIC)