

THE RELATIONSHIP OF PRESSURE TO THE VOLUME AND DENSITY OF A GAS (BOYLE'S LAW)

Boyle's law: If the pressure goes up, volume goes the same amount down.

What does pressure do to you? The good news is that it has no effect on the parts of you where there is no air (and that is biggest part of you). Unfortunately, it does compress the air spaces inside of you, for instance in your ears, or lungs. Pressure pushes the atoms of a gas, such as air, closer together. The same number of molecules occupy a smaller space. So, under pressure, the volume of the gas becomes smaller but the density becomes greater. It can help to imagine taking a balloon underwater. As you take it down and the pressure increases, the balloon gets smaller, but it has the same number of air molecule in it – the air cannot escape. The volume goes down, and so the density must go up. Now, when you take your balloon up again, and the pressure decreases, it gets bigger again: the volume increases, and density decreases.

Look at it this way: if the pressure goes up, the volume goes down. If the volume goes down, the density goes up. The nice thing is that Mr Boyle discovered a few hundreds of years ago that these changes always happen in the same way. If you make the pressure four times as high, the volume becomes four times as small, and the density becomes four times as big. Or if you make the pressure ten times as high, the volume becomes ten times as small, and the density becomes ten times as big. If you know the change in pressure, you know it all! Boyle got his name in history with this simple discovery, and we are going use his law to calculate changes in volume.