# Explanation of Physical Properties and Gas Laws Based on the Kinetic Molecular Theory

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| **1** | Gases can be compressed easily | **1** Because gas particles are far apart, they easily can be squeezed closer together by an outside force. |
| **2** | Gases expand to fill the volume of their container | **2** Gas particles are constantly moving with no attractive forces between particles, so they will expand until they meet an outside force, namely, the wall of the container. |
| **3** | Gases have a low density | **3** Because g gas is mostly empty space, there are few particles (low mass) per unit volume. |
| **4** | Gases can diffuse through each other | **4** Gas particles are constantly moving and are separated by large distances. This leads to freedom for particles of one gas to move through the empty space of another gas. |
| **5** | Gases can exert a pressure on container walls | **5** Moving gas particles collide with container walls, thus exerting a force on every square inch. |
| **6** | Boyle's law: $V \propto P^{-1}$ | **6** When the volume of gas is *decreased*, the particles collide with the walls more often, leading to a *greater pressure*. When volume of gas is *increased*, particles collide less often, leading to a *decreased pressure*. |
| **7** | Charles' law: $V \propto T$ | **7** Increased temperature causes particles to move faster, leading to more and "harder" collisions with walls. Pressure inside the walls is increased until the volume expands to the point where the pressure inside the walls is again equal to the pressure outside. |
| **8** | Dalton's Law of partial pressures: $P_{Total} = P_1 + P_2 + P_3 + P_4 + \ldots$ | **8** Since the particles move independently of one another, each gas in a mixture will exert a pressure independent of the pressure of the other gases. The total pressure will be the sum of the individual pressures. |