

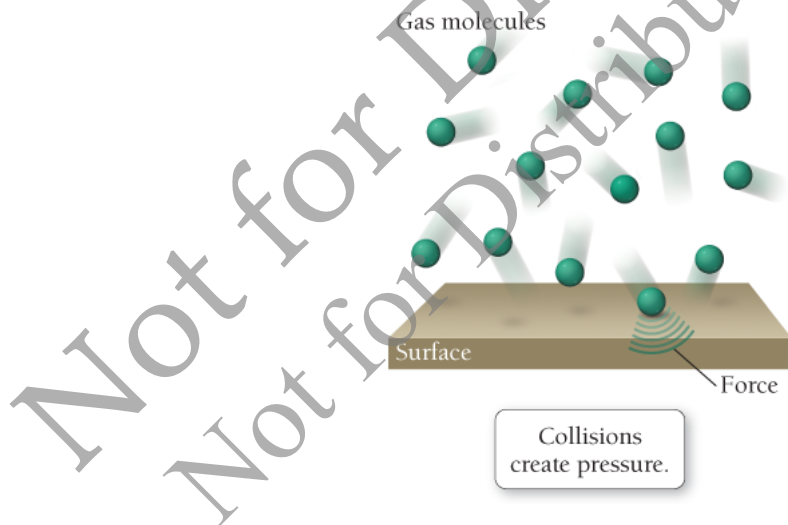
10.1: Supersonic Skydiving and the Risk of Decompression

On October 14, 2012, just after midday in New Mexico, Austrian daredevil Felix Baumgartner stepped into the dark void of space 24 mi (38.6 km) above Earth's surface. Baumgartner's 20-minute journey back to the desert floor broke the sound barrier and shattered the previous skydiving record of 19.5 mi. (31.4 km).

When Baumgartner stepped into space, he was protected from the surrounding vacuum by a pressurized suit. The suit contained air at a pressure similar to that found on the surface of Earth. **Pressure** is the force exerted per unit area by gas particles as they strike the surfaces around them (Figure 10.1). Just as a ball exerts a force when it bounces against a wall, so a gaseous atom or molecule exerts a force when it collides with a surface. The result of many of these collisions is pressure—the constant force on the surfaces exposed to any gas. The total pressure exerted by a gas depends on several factors, including the concentration of gas particles in the sample; the lower the concentration, the lower the pressure. At 24 mi. (38.6 km) above Earth's surface, the concentration of gas particles is much lower than at sea level; consequently, the pressure is very low. Without the pressurized suit, Baumgartner could not survive the space-like conditions.

Figure 10.1 Gas Pressure

Pressure is the force per unit area exerted by gas molecules colliding with the surfaces around them.



One of the risks that Baumgartner faced during his dive was uncontrolled decompression. Any significant damage to the suit would cause the air within the suit to escape, resulting in a large pressure drop. While the effects of a large pressure drop are sometimes exaggerated—for example, one urban myth erroneously claims that a person can explode—they are nonetheless lethal. For example, if a pressure drop had occurred fast enough, a large pressure difference would have quickly developed between the air in Baumgartner's lungs and the surrounding vacuum. The pressure difference would have caused his lungs to expand too much, resulting in severe lung damage. Fortunately, Baumgartner's suit worked just as it was designed to do, and he plunged safely back to Earth without incident.

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