When you compress a gas, you get a pocket of higher pressure where it’s being compressed. At high pressure you have more collisions, you have to do more work to compress the container, so the temperature increases more that it would if it were reversible. The same sort of thing happens when you expand. You get a pocket of low pressure, making fewer molecules hit the moving surface, so fewer are slowed down. So the better mixed your gas is, the less of a pressure pocket you have, and the more reversible your compression is. This means that as pressure goes down and temperature goes up, a given rate of compression will be more reversible. If imperfect mixing causes irreversibility, a reversible process must be one where after a molecule hits the moving wall, you wait for perfect mixing before moving again.