

Answer on Question #41156, Physics, Molecular Physics

Question: two samples of gas is initially at same temp, pressure and volume. one sample is compressed from v to $v/2$ isothermally and other one is compressed from v to $v/2$ adiabatically then increase in pressure is more in adiabatic than in isothermal comp why?

Solution. Thats because the isothermic change of pressure is inverse proportion to change of volume

$$PV = \text{const}, \quad P \sim \frac{1}{V}$$

while adiabatic one is

$$PV^\gamma = \text{const}, \quad P \sim \frac{1}{V^\gamma}$$

where γ is adiabatic constant and is bigger then 1. Hence, with the same change of volume the pressure decrease more rapid in adiabatic process.