Answer on Question #48118, Physics, Molecular Physics | Thermodynamics

An ideal gas is enclosed in a container of volume V at pressure P. It is being pump out of the container by using a pump with stroke volume V_1. what is the final pressure in container after n stroke of the pump?

Solution:

Before doing n strokes, the parameters of the system were P, V.

After doing n strokes, parameters became $V-nV_1$, P_1 , where P_1 is unknown.

An ideal gas can be characterized by three state variables: absolute pressure (P), volume (V), and absolute temperature (T). The relationship between them may be deduced from kinetic theory and is called the *ideal gas law*:

$$PV = \nu RT$$

Since the temperature is constant, PV=const .

Thus,

$$PV = P_1(V - nV_1)$$

$$P_1 = \frac{PV}{V - nV_1}$$

this is the final pressure after n-stroke.