

J01T.1—Containers of Ideal Gas

Problem

Consider two containers filled with the same ideal gas, each initially with the same volume V_1 , temperature T_1 and pressure P_1 . The volume of one of the containers is subsequently reduced from V_1 to V_2 while keeping the temperature fixed.

- a) What is the heat Q yielded by the container during this isothermal compression process?
- b) Determine the maximal work W that could be done by subsequently connecting the two containers, such that $V_1 + V_2$ remains constant and no additional heat flows in to or out of the system.
- c) Show that W is smaller than Q . Hint: Compare their derivatives with respect to V_2 .