

Estimating rate of change

The accompanying plot below shows constant temperature T (in Kelvin) level curves as given by the ideal gas law $pV = nRT$ with $n = 0.15$ mol and $R = 0.082$ L·atm/(mol·K).

1. Estimate the rate of change in temperature T with respect to change in volume V for $V = 0.2$ L and $p = 0.2$ atmospheres.
2. Estimate the rate of change in temperature T with respect to change in pressure p for $V = 0.2$ L and $p = 0.2$ atmospheres.
3. Repeat Steps 1 and 2 for each of the following (V, p) pairs.
 - (a) (0.2 L, 0.4 atm)
 - (b) (0.2 L, 0.6 atm)
 - (c) (0.2 L, 0.8 atm)
 - (d) (0.4 L, 0.2 atm)
 - (e) (0.6 L, 0.2 atm)
 - (f) (0.8 L, 0.2 atm)
4. Use your previous results to make a plot showing rate of change in temperature T with respect to volume V versus pressure p for $V = 0.2$ L.
5. Use your previous results to make a plot showing rate of change in temperature T with respect to volume V versus volume V for $p = 0.2$ atm.
6. Use your previous results to make a plot showing rate of change in temperature T with respect to pressure p versus pressure p for $V = 0.2$ L.
7. Use your previous results to make a plot showing rate of change in temperature T with respect to pressure p versus volume V for $p = 0.2$ atm.

