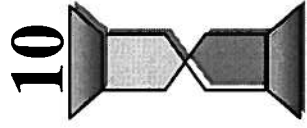
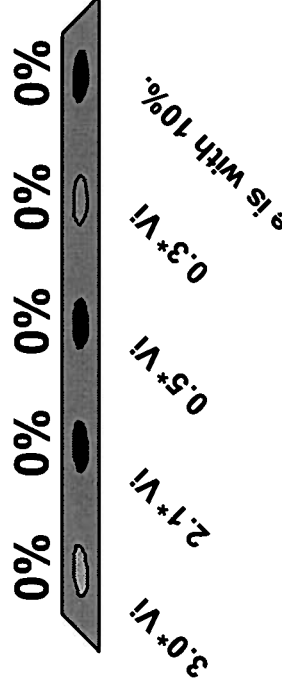


A gas filled balloon of volume, V_i , at $P_i = 1.0$ atm. and $T_i = 300$ K, rises to an altitude where $P_f = 0.4$ atm. and $T_f = 250$ K. Its volume there is, most

nearly, $V_f =$



- 1. $3.0 * V_i$
- ✓ 2. $2.1 * V_i$
- 3. $0.5 * V_i$
- 4. $0.3 * V_i$
- 5. None is with 10%.



The correct answer is (b) $V_f = 2.1 \cdot V_i$; as follows.

- Write the Ideal Gas Law twice,
- $P_f V_f = N k_B T_f$
- $P_i V_i = N k_B T_i$
- And divide one equation by the other to obtain:
- $P_f V_f / P_i V_i = N k_B T_f / N k_B T_i = T_f / T_i$. Then
- $V_f = (T_f / T_i) \cdot (P_i / P_f) V_i = (250 / 300) \cdot (1.0 / 0.4) V_i = 2.08 V_i$
- (Always try to use ratios in these ideal gas problems: they get rid of the constant, $N k_B$.)