Real gas behavior: Challenge problem

Exercise 11.69: Calculate ideal and real pressure of 8.00 mol of Cl_2 confined in 4.00 L at 27 °C.

$$a = 6.58 \text{ bar } L^2/mol^2 \text{ and } b = 0.0562 \text{ L/mol}$$

$$p_{ideal} = \ldots$$
$$n\,R\,T/V = \ldots$$
49.9 bar

$$p_{real} = \ldots$$
$$n\,R\,T/(V - b\,n) - a(n/V)^2 = \ldots$$
$$56.2 \text{ bar} - 26.3 \text{ bar} = \textbf{29.9 bar}$$

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24

Real gas behavior: Challenge problem

The boiling point of H_2 is −252.87 °C. Calculate in bar the ideal-gas pressure, p_{empty}, and the actual pressure, $p_{observed}$, of 1.00 mol of $H_2(g)$ at −250., 0., 250. and 2500. °C in a 2.000 L container. At which temperature, if any does molecular attraction dominate the effect of molecular size?

Values at 250 °C: $p_{empty} = 21.7$ bar and $p_{observed} = 22.0$ bar

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25