Lecture Notes: Real Gases

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Morehouse College Fall 2017

Deviations from Ideal Behavior, Gas Compressibility

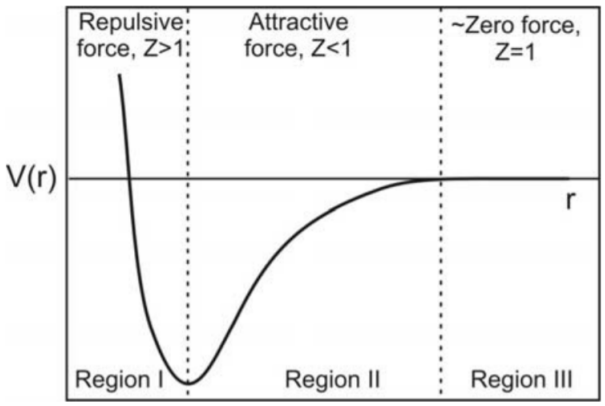

Figure 1: Potential energy of interaction for two molecules or atoms is shown as a function of their separation, r. The curve is split into three regions where the repulsive force dominates (Region I), attractive force dominates (Region II), and a region with little interactive forces between the two particles (Region II).

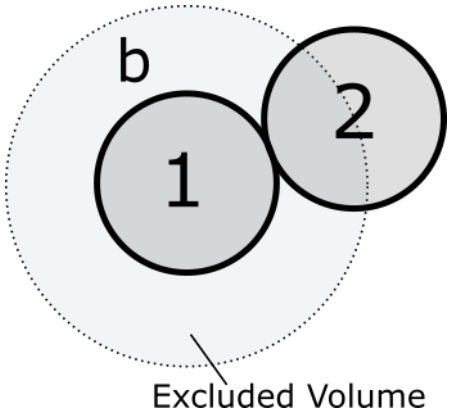

Figure 2: Caption detailing the excluded volume included in the volume correction to the Van Der Waals gas equation. This factor accounts for the space in which a particle is unable to move due to the presence of another particle.

Substance	a(L^2-atm/mol^2)	b (L/mol)
He	0.0341	0.02370
Ne	0.211	0.0171
Ar	1.34	0.0322
Kr	2.32	0.0398
Xe	4.19	0.0510
H_2	0.244	0.0266
N_2	1.39	0.0391
O_2	1.36	0.0318
Cl_2	6.49	0.0562
H_2O	5.46	0.0305
CH_4	2.25	0.0428
CO_2	3.59	0.0427
CCl_4	20.4	0.1383

Figure 3: Van der Waal's constants for some common gases.

Problem 1: What pressure is exerted by 30.0 mol of CO_2 introduced into a vessel of 65.0 L volume at 126.8°C