

11) Show that for a gas that obeys Dieterici's equation

$$p(V_m - b) \exp(a/RTV_m) = RT$$

the coefficient of thermal expansion  $\alpha$  is given by the expression

$$\alpha = \frac{RV_m + (a/T)}{pV_m^2 \exp(a/V_m RT) - a}$$

12) Derive an expression for the ratio  $\kappa_T/\kappa_T^{\text{ig}}$  of the isothermal compressibility  $\kappa_T$  of a gas relative to the isothermal compressibility  $\kappa_T^{\text{ig}}$  of an ideal gas (at the same temperature  $T$  and molar volume  $V_m$ ). Approximate the virial expansion for the compression factor of the real gas by truncating it after the third virial term? [ $\{1 + 2\langle B/V_m \rangle + 3\langle C/V_m^2 \rangle\}^{-1}$ ].