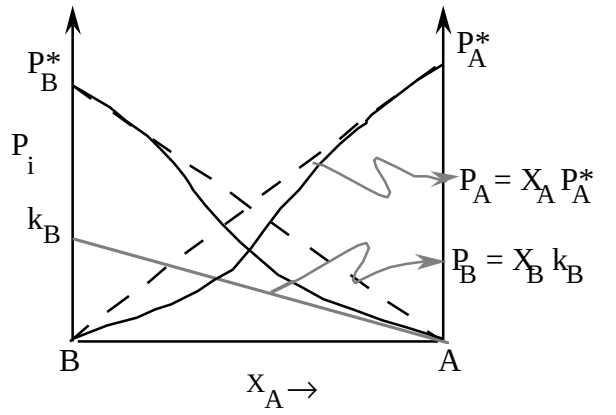
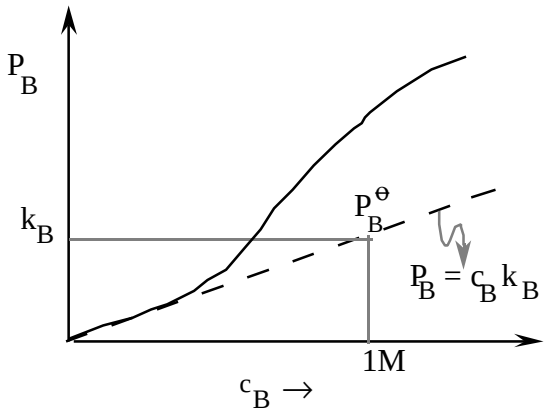
Different Concentration Measures and Standard States



Mole Fraction



Molarity

$\mu_A = \mu^*_{X,A} + RT \ln X_A$ solvent	$\mu_A = \mu^{\theta}_{c,A} + RT \ln c_{A}/c^{\theta}$ solvent
$\mu_B = \mu^{\dagger}_{X,B} + RT \ln X_B$ solute	$\mu_B = \mu^{\theta}_{c,B} + RT \ln c_{B}/c^{\theta}$ solute
$\mu_B = \mu^{\dagger}_{X,B} + RT \ln a_B$ real	$\mu_B = \mu^{\theta}_{c,B} + RT \ln a_B$ real

$\mu_B = \mu^{\dagger}_{X,B} + RT \ln a_x$ $\qquad a_x = {}^{x}\gamma \; X$

$\mu_B = \mu^{\theta}_{c,B} + RT \ln a_c$ $\qquad a_c = {}^{c}\gamma \; c/c^{\theta}$

$\mu_B = \mu^{\theta}_{m,B} + RT \ln a_m$ $\qquad a_m = {}^{m}\gamma \; m/m^{\theta}$

${}^{x}\gamma \cong {}^{c}\gamma \cong {}^{m}\gamma$ for solutions more dilute than 0.1 M

Changing Concentration Measures

$N_2O_4 \leftrightarrow 2\ NO_2$ $\qquad K_x = \dfrac{X^2_{NO_2}}{X_{N_2O_4}} = 8.70\text{x}10^{-11}$

	X_i	c_i (mol L^{-1})	m_i (mol kg^{-1})
NO_2	$1.47\text{x}10^{-6}$	$1.85\text{x}10^{-3}$	$1.85\text{x}10^{-3}$
N_2O_4	$2.48\text{x}10^{-2}$	0.324	0.335

$K_c = \dfrac{c^2_{NO_2}}{c_{N_2O_4}} = 1.09\text{x}10^{-5}$ mol L^{-1} $\qquad K_m = \dfrac{m^2_{NO_2}}{m_{N_2O_4}} = 1.06\text{x}10^{-5}$ mol L^{-1}