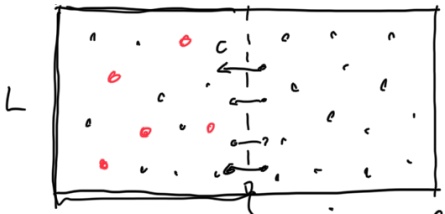
Osmosis

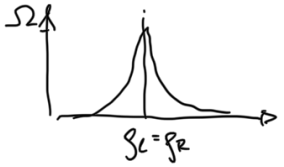


$N_{w,l}$ $N_{w,r}$

$N_{p,l} > 0$ $N_{p,r} = 0$ $N_p << N_w$

$V_l = V_r = \frac{V}{2}$

$P_l = P_r$



$\rho = \frac{N}{V}$ water particles

How do N_w distribute?

Equilibrium of water $\rho_L = \rho_r$, $N_p << N_w$ => $P_{wl} = P_{wr}$

Red particles cannot move => contribute on left side. How?

Dilute solution of red part. => non-interacting

Ideal gas of red particles.

EOS on left side $P_p \cdot V_L = N_p kT$

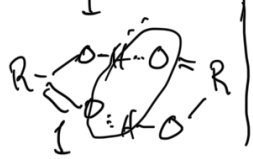
$P_{w,l} = P_{w,r}$ => Pressure difference $\Delta P = P_L - P_R^{\prime\prime 0} = \rho_p kT$ $\rho_p = \frac{N_p}{V_L}$

Excess pressure

cells in our eyes : $\Delta P = \rho_{NaCl} kT$

Empirical equation van't Hoff : $\Delta P = \varphi_i \rho_i kT$ ρ_i = solute concentr.

φ_i = dim. less number # solution particles for one solute part.

	solute	solution	φ_i
NaCl	1	$Na^+ + Cl^-$	2
glucose	1	1	1
carboxylic acid	2		$\frac{1}{2}$

$\rho_p = \varphi_i \rho_i$
