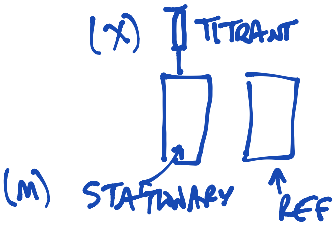
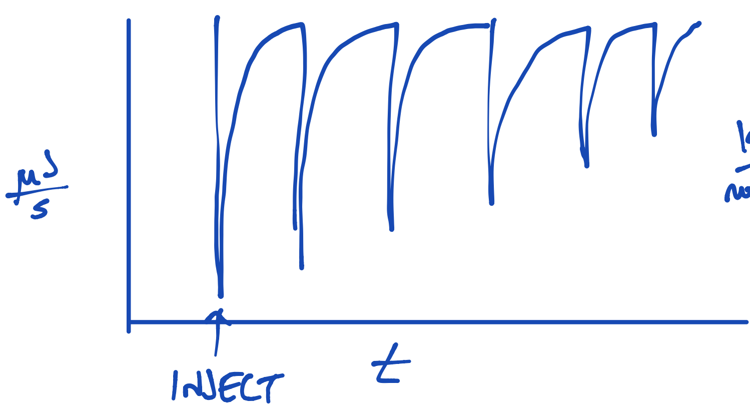
LAST CLASS: HIGH $C_p$ POINTS TO IMPORTANCE OF HYDROPHOBIC EFFECT FOR FOLDING.

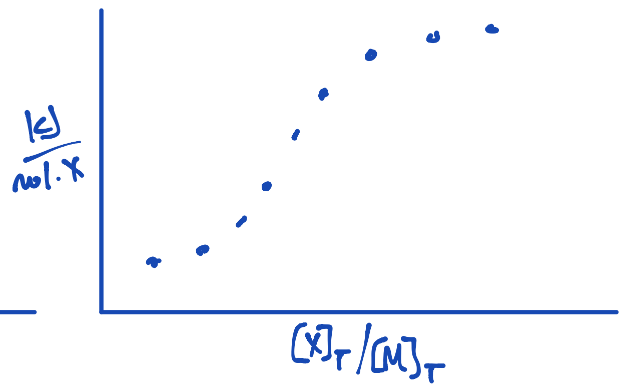
WHAT ABOUT INTERACTIONS BETWEEN BIOMOLECULES?

PROBE BY ISOTHERMAL TITRATION CALORIMETRY.




1. INJECT SMALL AMOUNT OF TITRANT
2. APPLY POWER TO STATIONARY OR REF CELL TO MAINTAIN SAME TEMP IN BOTH CELLS.
3. MEASURE POWER




$$M + X \rightleftharpoons MX$$

$M_T$ = TOTAL [M]
$X_T$ = TOTAL [X]

IF ENTHALPY CHANGE, THIS WILL EVOLVE/TAKE UP HEAT.

EXOTHERMIC ENDOTHERMIC

$dH = \delta Q$ (NO PdV WORK)

IF WE DUMP A TON OF TITRANT IN, GO TO ALL MX. $\oint \delta Q \rightarrow \underline{\Delta H}$.

WANT MORE INFORMATION.

ADD A LITTLE TITRANT:

$$\frac{MX_i}{M_T} \rightarrow \frac{MX_{i+1}}{M_T} \quad (0 \rightarrow)$$

$$q_{i+1} \propto \underset{\uparrow}{\Delta H} \underbrace{\left(\frac{MX_{i+1}}{M_T} - \frac{MX_i}{M_T}\right)}$$

ENTHALPY FOR RXN

STEP ON RXN COORD

SO WHAT DETERMINES $MX_i$? $[M]_T$, $[X]_T$, $K_1$

$$K_D = \frac{[M][X]}{[MX]}$$

$$K_D = \frac{(M_T - MX)(X_T - MX)}{MX}$$

$$K_D M_T = M_T X_T - M_T MX - X_T MX + MX^2$$

$$\emptyset = M_T X_T - K_D MX - M_T MX - X_T MX + MX^2$$

$$\emptyset = M_T X_T - (K_D + M_T + X_T) MX + MX^2$$

$$MX = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$MX = \frac{(K_D + M_T + X_T) - \sqrt{(K_D + M_T + X_T)^2 - 4[M]_T[X]_T}}{2}$$

IF WE KNOW $K_D$, WE CAN CALCULATE [MT]. IF WE KNOW $\Delta H$ AND MT, WE CAN CALCULATE $q$ (WHAT WE OBSERVE). GUESS AND CHECK

FIT A MODEL WITH SINGLE $K_D$ AND $\Delta H$ TO ALL OBSERVED HEATS VS. $[X]_T$.

IF YOU KNOW $\Delta H$ AND $\Delta G$ $(-RT\ln(K_D))$, YOU CAN FIND $\Delta S$.

HOW CAN WE USE TO LEARN MECHANISM?

$$\Delta H(T) = \Delta H_{REF} + \Delta C_p (T - T_{REF})$$

DO ITC @ MULTIPLE TEMP. IF $\Delta C_p > \emptyset$, LARGE HYDROPHOBIC CONTRIBUTION.