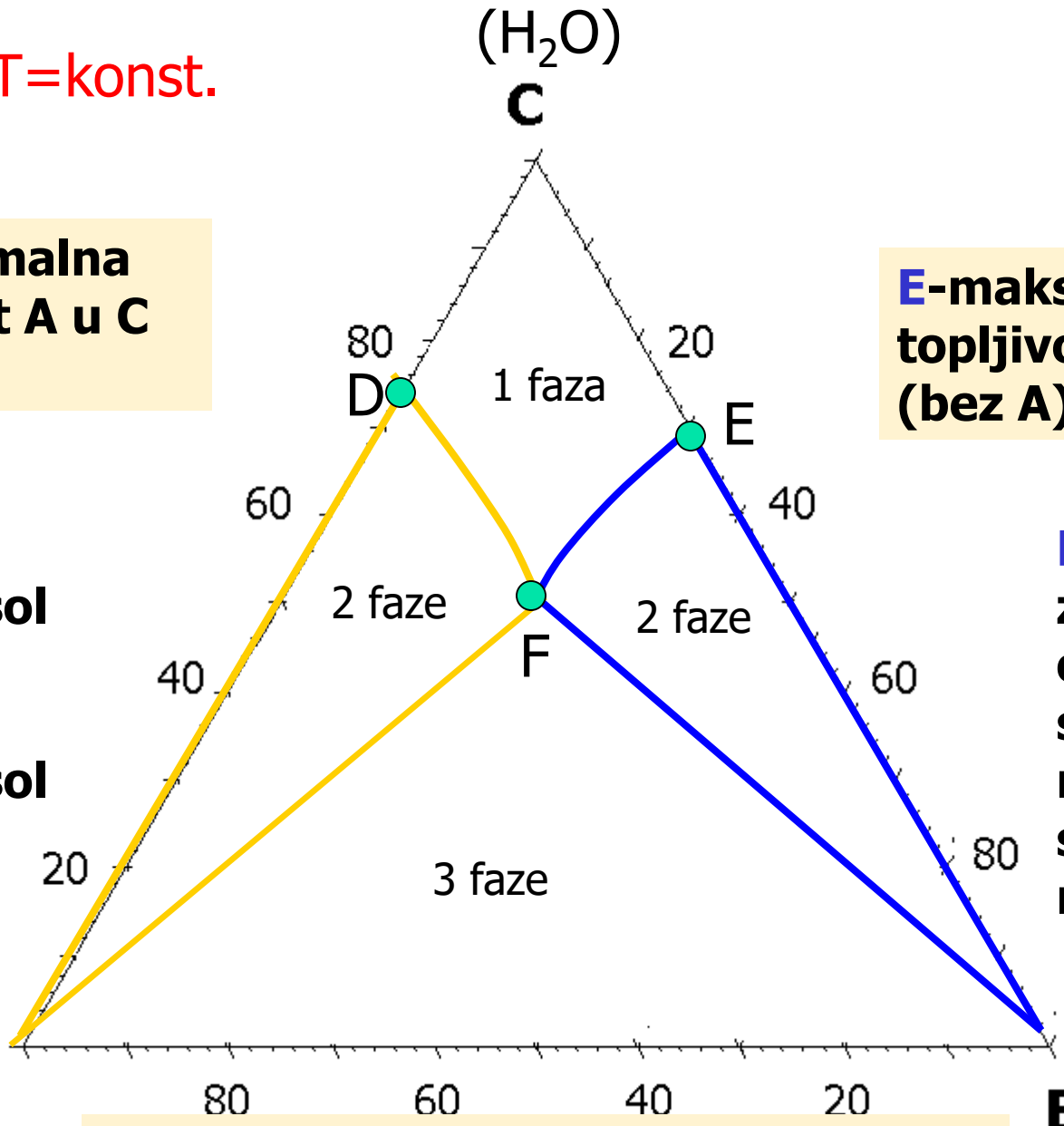
RAVNOTEŽA: KAPLJEVINA-KRUTINA

Dijagrami topljivosti dviju soli sa zajedničkim ionom

p,T=konst.



D-maksimalna topljivost A u C (bez B)

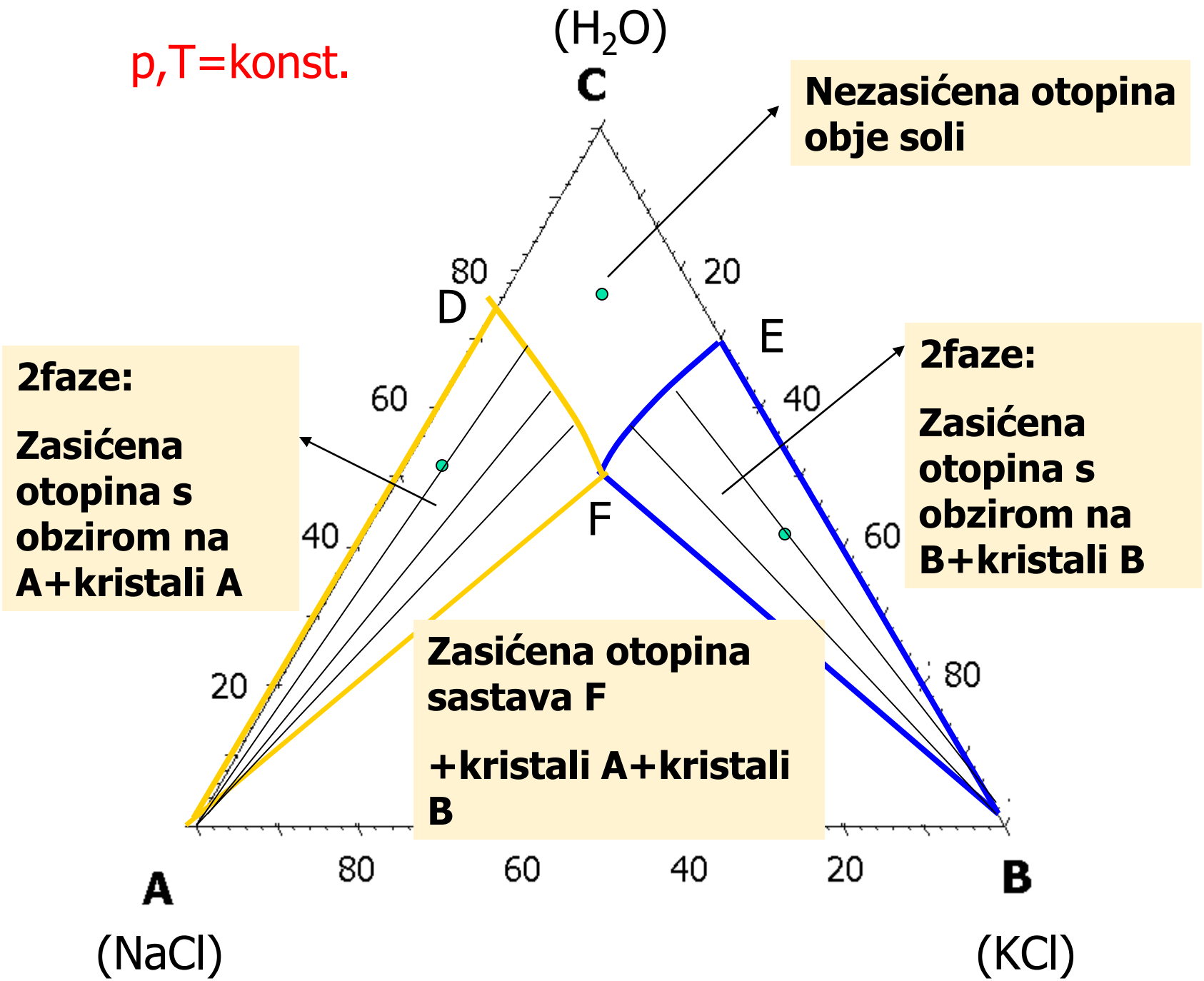
E-maksimalna topljivost B u C (bez A)

DF-otopina zasićena s obzirom na sol A (ali nezasićena s obzirom na sol B)

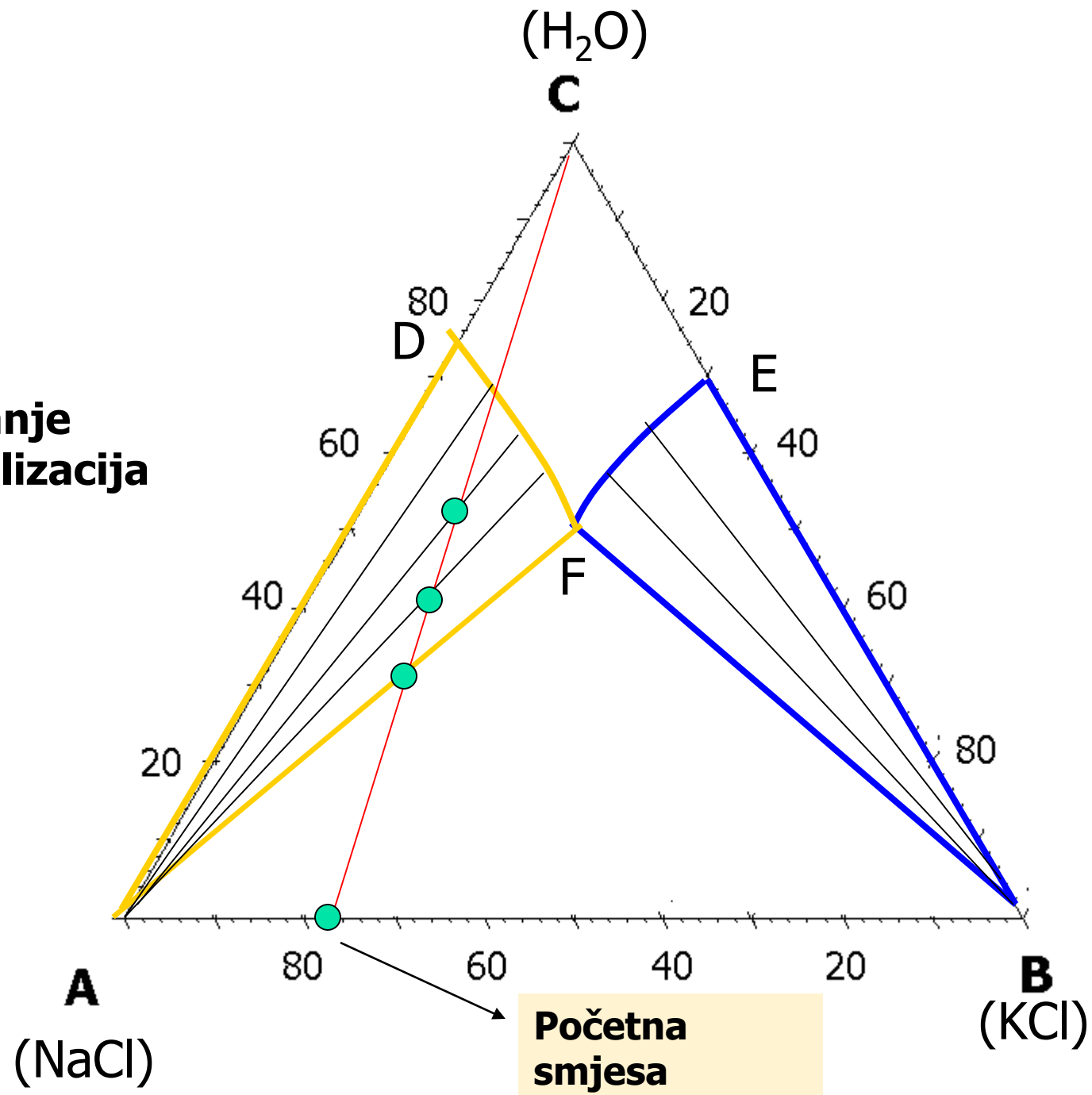
EF-otopina zasićena s obzirom na sol B (ali nezasićena s obzirom na sol A)

F-otopina zasićena s obzirom na obje soli

p,T=konst.

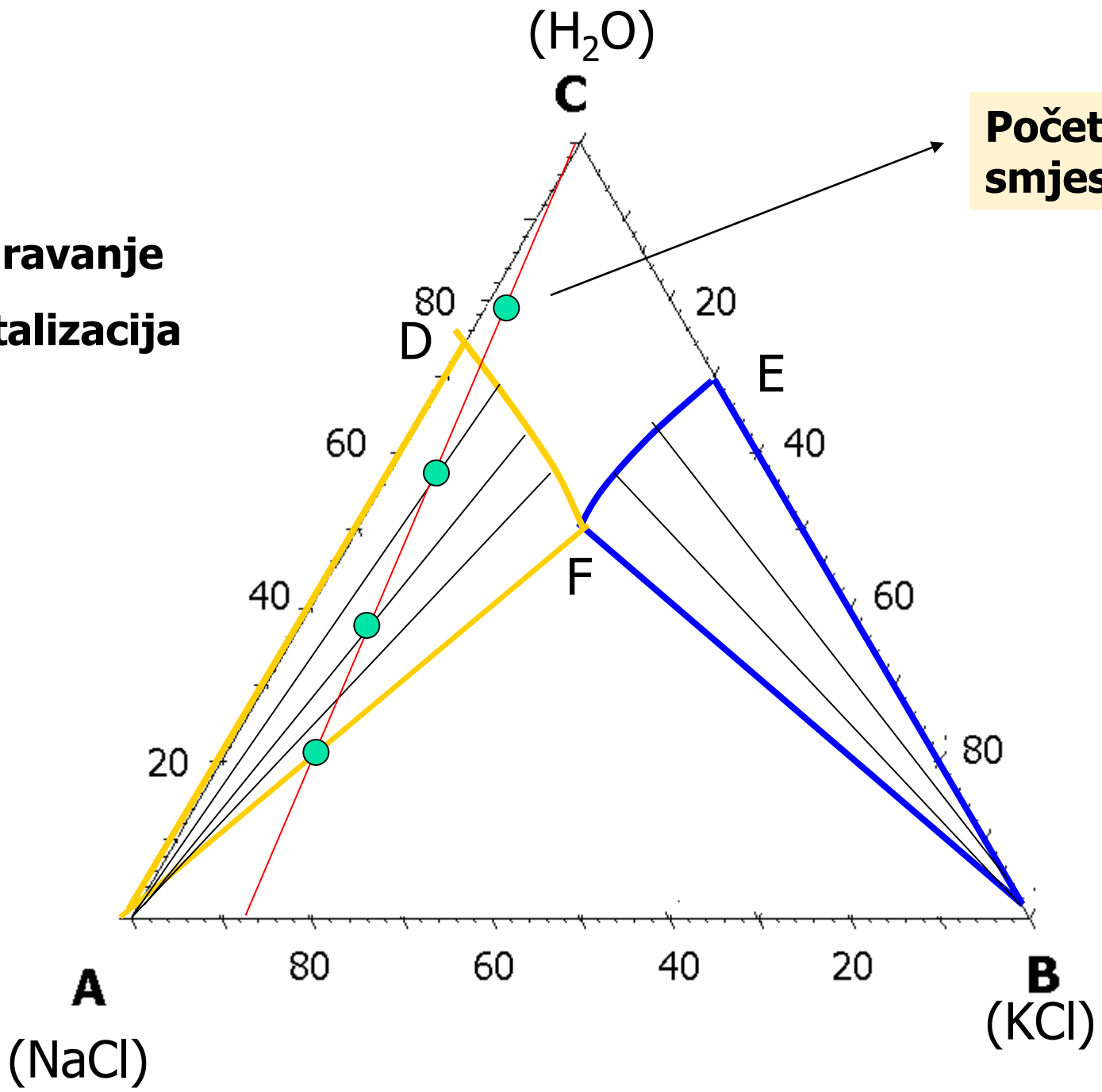

(H2O)
C
Nezasićena otopina obje soli
80
20
D
E
2faze:
Zasićena otopina s obzirom na A+kristali A
60
40
40
60
2faze:
Zasićena otopina s obzirom na B+kristali B
F
20
80
Zasićena otopina sastava F
+kristali A+kristali B
80
60
40
20
A
B
(NaCl)
(KCl)

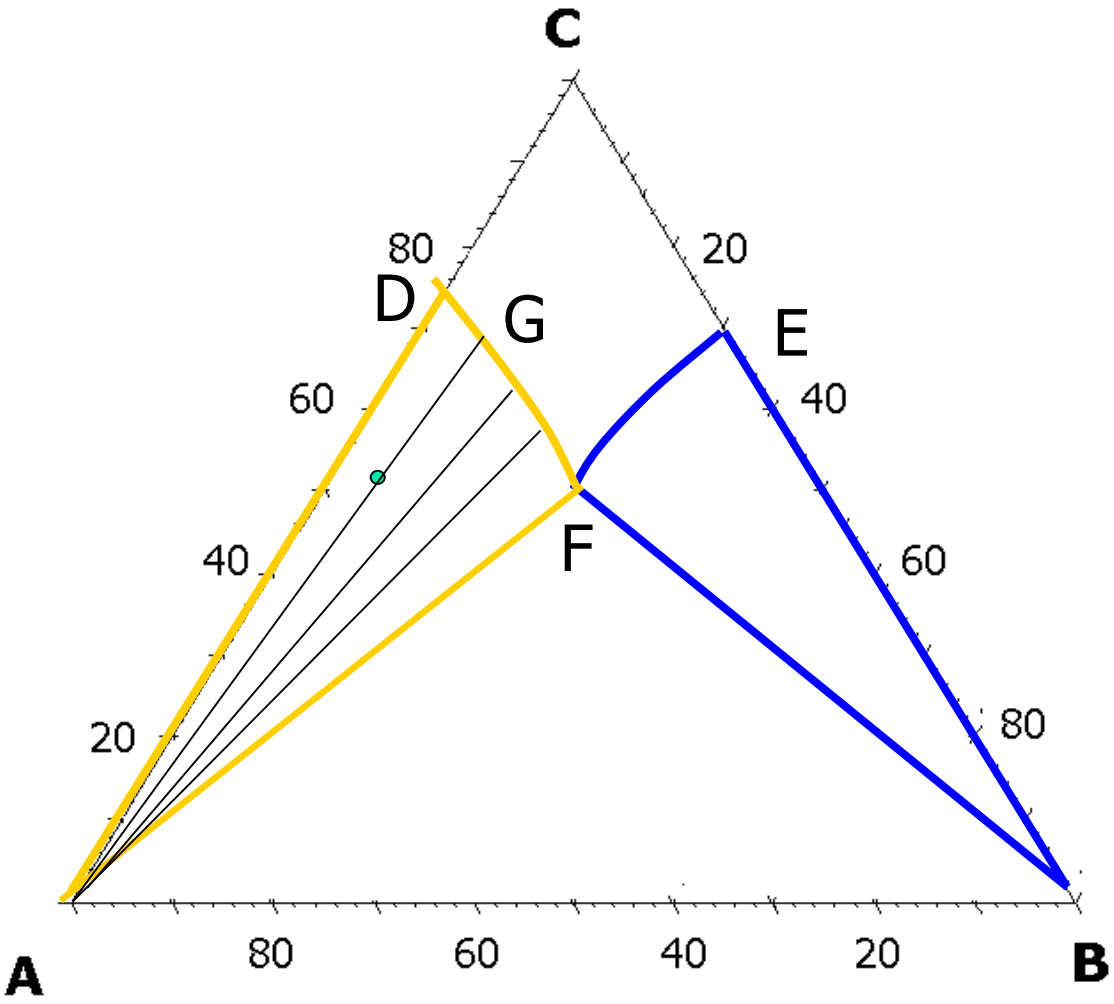
1.Otapanje
2.Kristalizacija



1. Isparavanje

2. Kristalizacija

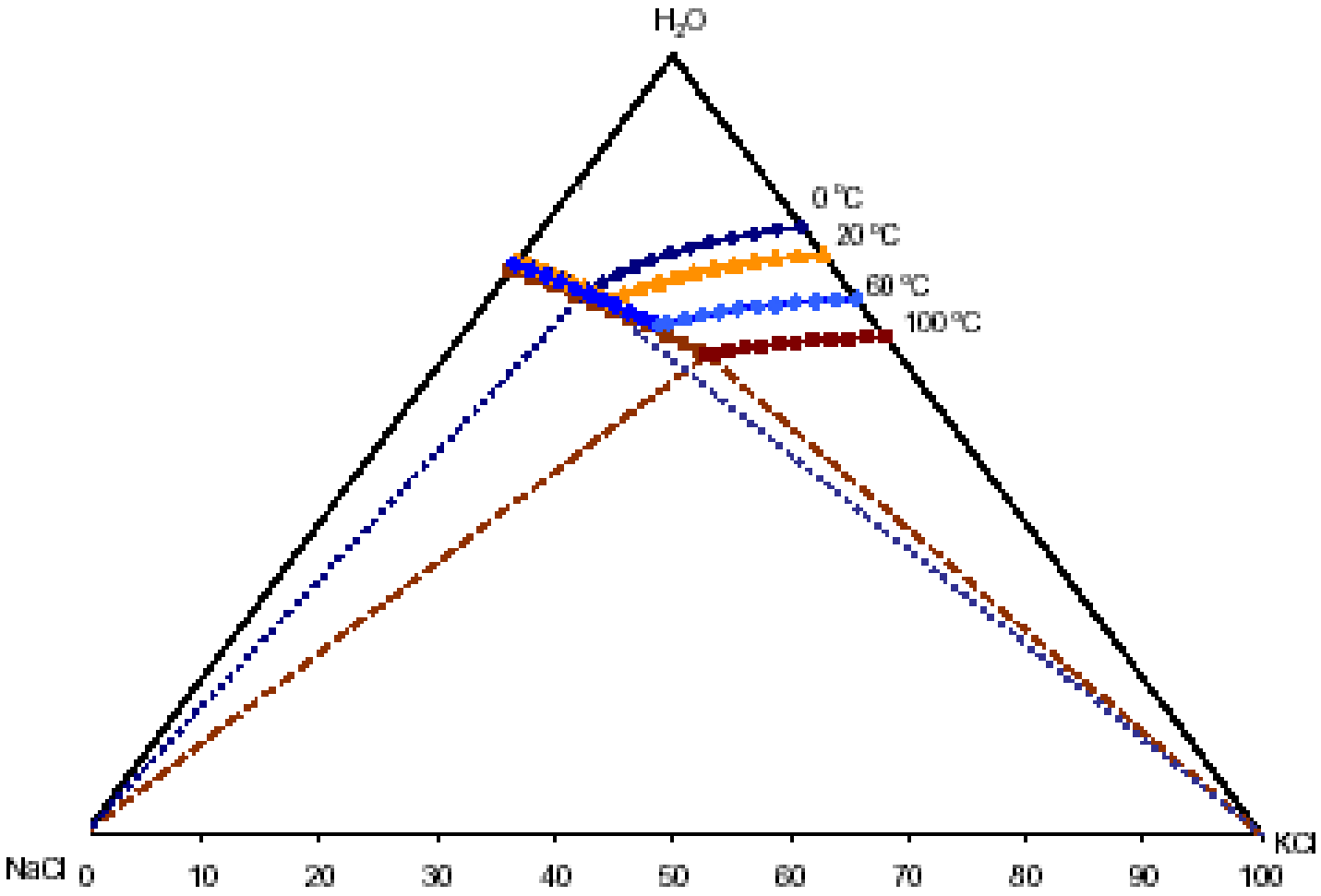




Uvjet ravnoteže:

$$dG_{m,A}^{A} = d\overline{G}_{m,A}^{G}$$

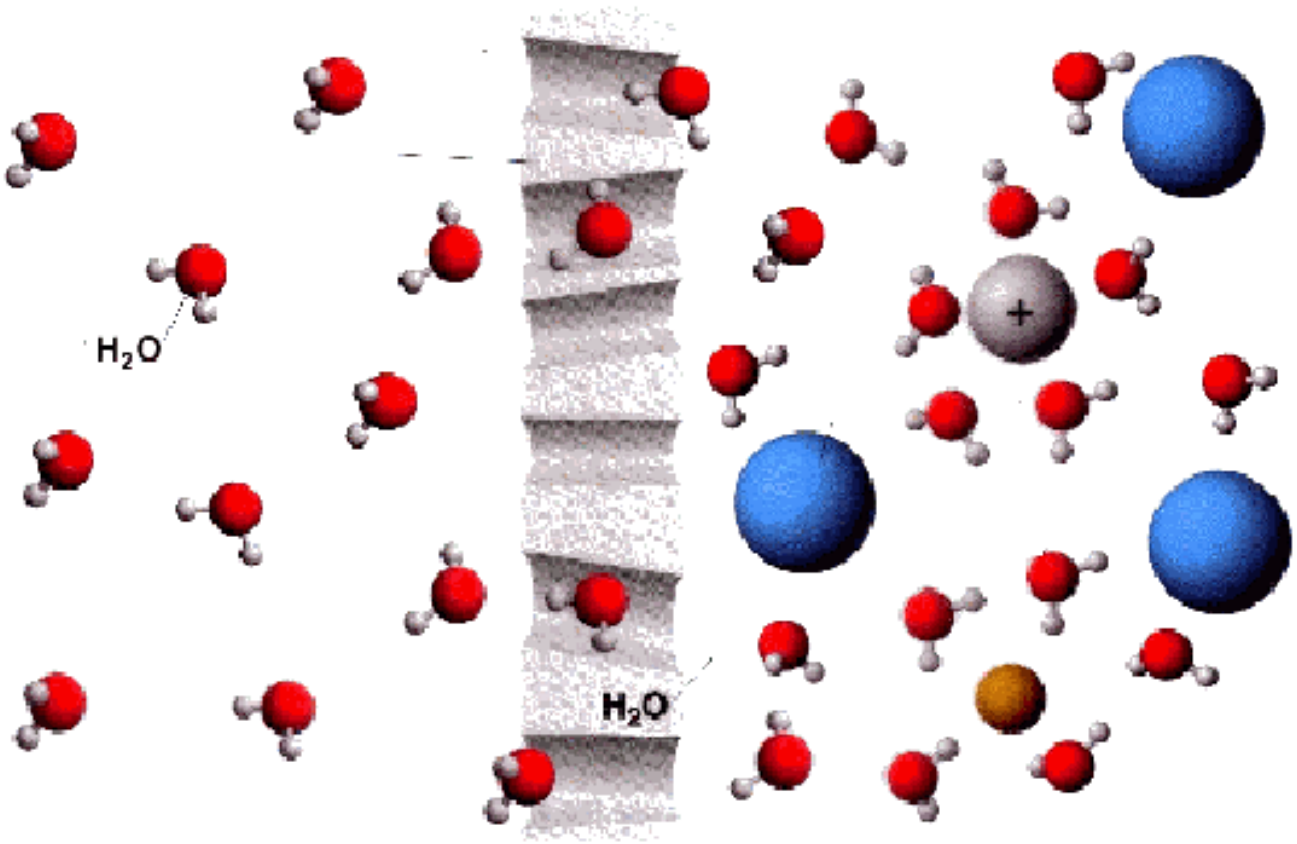
$$V_{m,A}^{A}dp - S_{m,A}^{A}dT = \overline{V}_{m,A}^{G}dp - \overline{S}_{m,A}^{G}dT + RTd\ln a_{A}^{G}$$

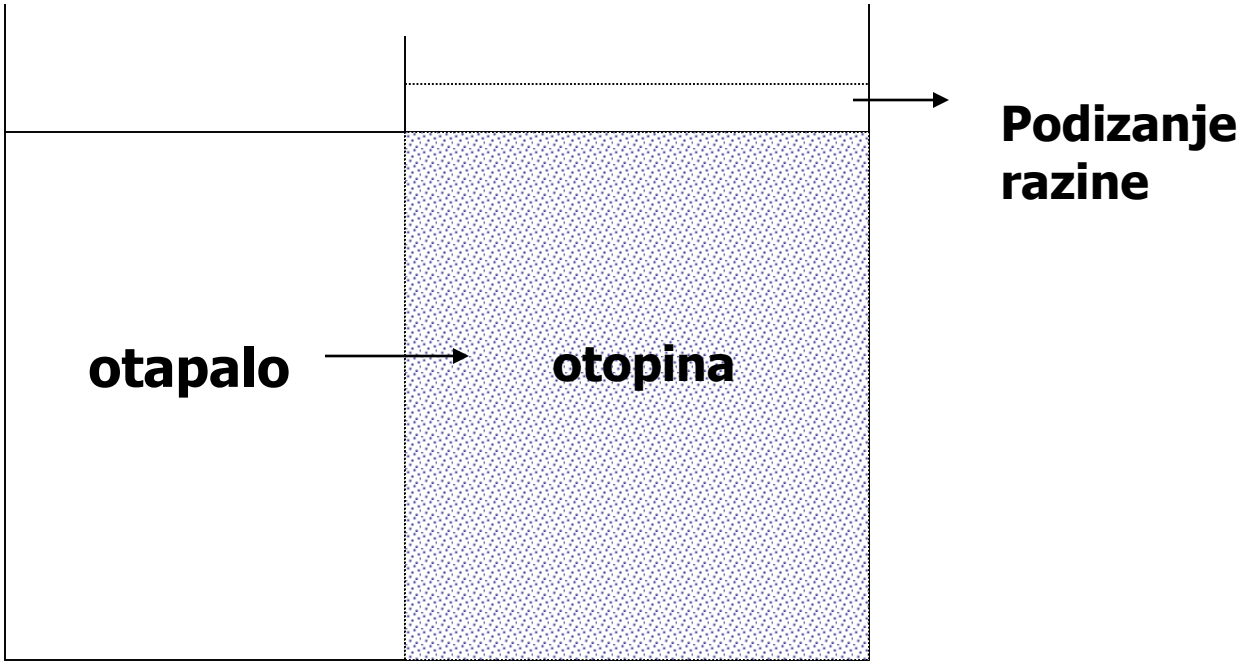

H2O
0 °C
20 °C
60 °C
100 °C
NaCl
KCl
0
10
20
30
40
50
60
70
80
90
100



OSMOTSKA RAVNOTEŽA

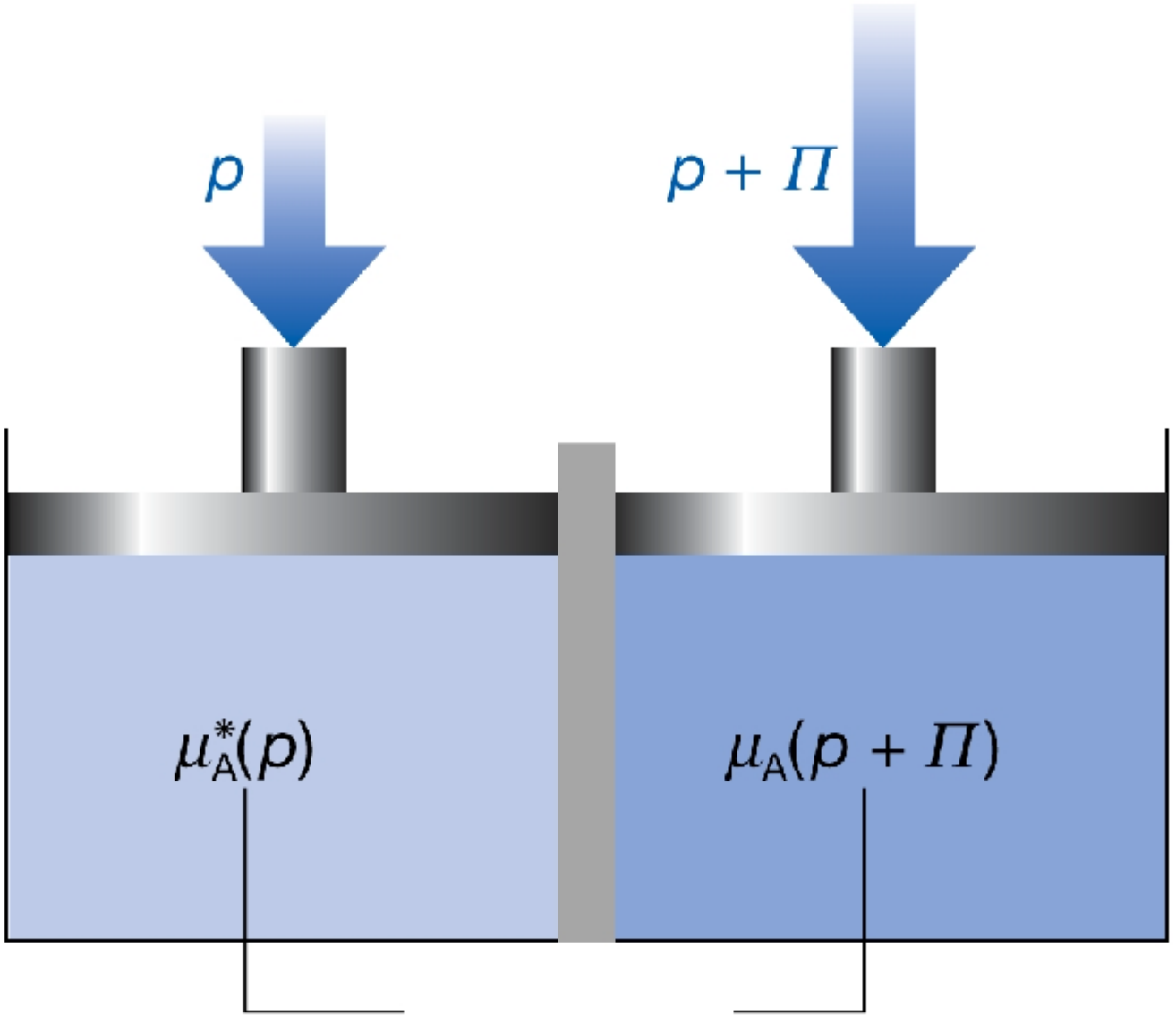
Osmoza-spontani prijelaz otapala u otopinu odijeljenu od otapala polupropusnom membranom (propusnom za otapalo nepropusnom za otopljenu tvar)


H_2O
H_2O
+



Ravnoteža: hidrostatski tlak = osmotski tlak

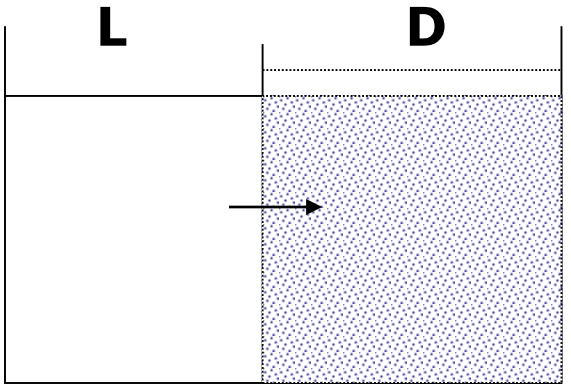
Osmotski tlak, Π -tlak koji je potrebno primjeniti na otopinu kako bi se spriječio ulaz otapala u otopinu



Jednaki u ravnoteži

Uvjet ravnoteže:

$$dG_{m,A}^{L} = d\overline{G}_{m,A}^{D}$$



$$V_{m,A}^{L}dp - S_{m,A}^{L}dT = \overline{V}_{m,A}^{D}dp - \overline{S}_{m,A}^{D}dT + RTd\ln a_A^D$$

T= konst, dT=0

dp=0

$$0 = \overline{V}_{m,A}^{D}dp + RTd\ln a_A^D$$

$$\overline{V}_{m,A}^{D}dp = -RTd\ln a_A^D$$

Razrijeđena otopina:

$$a_A \approx x_A = 1 - x_B$$

$$d \ln a_A = d \ln(1 - x_B) \approx -dx_B$$

$$\ln(1 - x_B) \approx -x_B - \frac{x_B^2}{2} - \frac{x_B^3}{3} \cdots$$

$$\approx -x_B$$

$$\overline{V}_{m,A}^{D} dp = RT dx_B$$

$$\overline{V}_{m,A}^{D} \approx V_{m,A} \qquad \text{(Razrijeđena otopina!)}$$

$$V_{m,A} dp = RT dx_B \qquad / \int$$

$$\int_{p}^{p+\Pi} V_{m,A} dp = \int_{x_B=0}^{x_B} RT dx_B$$

Pretpostavka: $V_{m,A} = konst.$

$$V_{m,A} \cdot \Pi = RT x_B$$

$$\Pi = \frac{RT}{V_{m,A}} x_B$$

Van 't HOFF-ova JEDNADŽBA

Osmotski tlak je koligativno svojstvo

$$x_B = \frac{n_B}{n_A + n_B} \cong \frac{n_B}{n_A}$$

$$\Pi = \frac{RT}{V_{m,A}} \frac{n_B}{n_A}$$

→ **Ukupni volumen otapala**

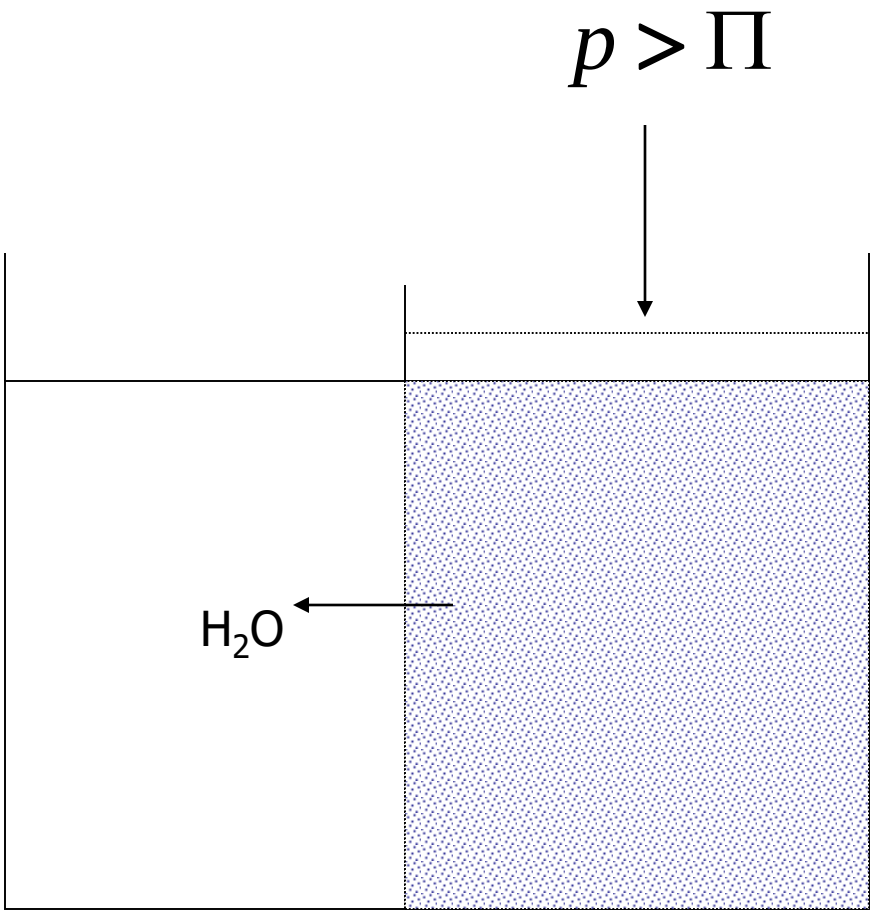
$$\Pi = c_B RT$$

$$n_B = \frac{m_B}{M_B}$$

$$\Pi = \frac{RT}{M_B} \frac{m_B}{V_A} = \frac{RT}{M_B} \gamma_B$$

→ **masena koncentracija**

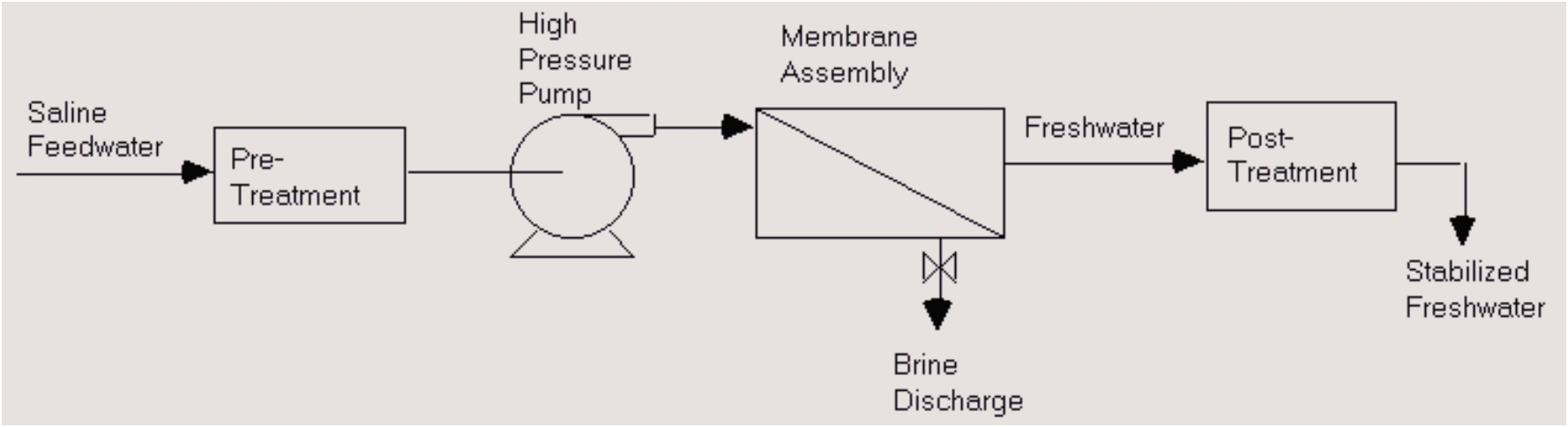
OSMOMETRIJA-metoda za određivanje molekulske mase



REVERZNA OSMOZA

-primjenom tlaka desalinira se morska voda npr.




Saline
Feedwater
Pre-
Treatment
High
Pressure
Pump
Membrane
Assembly
Freshwater
Post-
Treatment
Stabilized
Freshwater
Brine
Discharge