

Normalni uvjeti tlaka i temperature (n.u.): $p=101\,325\text{ Pa}$ $T=293,15\text{ K}$
 Standardni uvjeti tlaka i temperature (s.u.): $p=100\,000\text{ Pa}$ $T=273,15\text{ K}$
 (<https://goldbook.iupac.org/html/S/S06036.html> preuzeto 24-11-2018)

Avogadrova konstanta $N_A=L=6,022\cdot10^{23}\text{ mol}^{-1}$

Opća plinska konstanta $R=8,314\text{ Pa m}^3\text{ mol}^{-1}\text{ K}^{-1}$

Molarni volumen pri s.u. $V_m^\circ=22,4\text{ mol}^{-1}\text{ dm}^3$

FIZIKALNA VELIČINA		OSNOVNA SI JEDINICA	
NAZIV	SIMBOL	NAZIV	SIMBOL
Duljina	l	Metar	m
Masa	m	Kilogram	kg
Vrijeme	T	Sekunda	s
Električna struja	I	Amper	A
Termodinamička temperatura	T	Kelvin	K
Množina tvari	n	Mol	mol

Fizikalna veličina	Oznaka	Formula	Jedinica
Množina	$n(X)$	$n=\frac{m(X)}{M(X)}=\frac{N(X)}{L}=\frac{V^\circ(X)}{V^\circ m(X)}$	mol
Molarna masa	M		g mol^{-1}
Gustoća	ρ	$\rho(\text{otopine})=\frac{m(\text{otopine})}{V(\text{otopine})}$	g cm^{-3}

<i>Molalitet ili molalnost</i>	$b(X)$	$b(X) = \frac{n(X)}{m(\text{otapala})}$	mol kg^{-1}
<i>Množinska koncentracija</i>	$c(X)$	$c(X) = \frac{n(X)}{V(\text{otopine})}$	mol dm^{-3}
<i>Masena koncentracija</i>	$\gamma(X)$	$\gamma(X) = \frac{m(X)}{V(\text{otopine})}$	g dm^{-3}
<i>Množinski udio</i>	$x(X)$	$x(X) = \frac{n(X)}{n(\text{ukupna})}$	1
<i>Maseni udio</i>	$w(X)$	$w(X) = \frac{m(X)}{m(\text{ukupna})}$	1
<i>Volumni udio</i>	$\varphi(X)$	$\varphi(X) = \frac{V(X)}{V(\text{ukupni})}$	1

$$m(\text{ukupna}) = m(\text{otopine}) = m(\text{smjese}) = m(\text{otopljena tvar}) + m(\text{otapalo})$$

$$m(\text{otapalo}) > m(\text{otopljena tvar})$$

$X = \text{otopljena tvar}$

$$c(X) = \frac{n(X)}{V(\text{otopine})} = \frac{m(X)}{M(X) \cdot V(\text{otopine})} = \frac{w(X) \cdot m(\text{otopine})}{M(X) \cdot V(\text{otopine})} = \frac{w(X) \cdot \rho(\text{otopine})}{M(X)}$$

$$c(X) = \frac{n(X)}{V(\text{otopine})} = \frac{m(X)}{M(X) \cdot V(\text{otopine})} = \frac{\gamma(X)}{M(X)}$$

$$\text{Opća plinska jednažba: } p(X) \cdot V(X) = n(X) \cdot R \cdot T$$

$$\text{Osmotski tlak: } \Pi = i \cdot c(X) \cdot R \cdot T$$

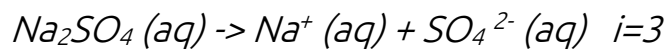
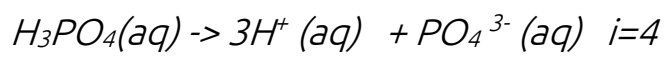
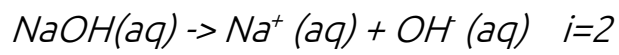
Tlak para otopine: $p(\text{tlak para otapala iznad otopine}) = x(\text{otapala u otopini}) \cdot p^\circ(\text{tlak para čistog otapala})$

$$\text{Povišenje vrelišta: } \Delta T = T_v(\text{otopine}) - T_v(\text{otapalo}) = K_{eb} \cdot b(X) \cdot i$$

$$\text{Sniženje tališta (ledišta): } \Delta T = T_t(\text{otapalo}) - T_t(\text{otopine}) = K_{kr} \cdot b(X) \cdot i$$

$i = 1$ za organske tvari (neelektroliti = saharoza, glukoza, naftalen)

$i \neq 1$ za tvari koje disociraju (elektroliti = anorganske soli, kiseline, lužine)



$$\Delta T = K_{\text{kr}} \cdot b(X) \cdot i = K_{\text{kr}} \cdot \frac{n(X)}{m(\text{otapala})} \cdot i = K_{\text{kr}} \cdot \frac{m(X)}{m(\text{otapala}) \cdot M(X)} \cdot i$$

$$\Delta T = K_{\text{eb}} \cdot b(X) \cdot i = K_{\text{eb}} \cdot \frac{n(X)}{m(\text{otapala})} \cdot i = K_{\text{eb}} \cdot \frac{m(X)}{m(\text{otapala}) \cdot M(X)} \cdot i$$