

COSTANTI

$$N_A = 6,022 \cdot 10^{23} \text{ mol}^{-1}$$

$$k_B = 1,38 \cdot 10^{-23} \text{ J/K}$$

$$F = N_A \cdot e = N_A \cdot 1,602 \cdot 10^{-19} \text{ C} = 96485$$

$$R = 8,31 \text{ J/K mol} \quad \alpha \text{ energie in gioco o percol}$$

$$0,082 \text{ se atm o } \approx \text{bar}$$

$$1 \text{ atm} = 101325 \text{ Pa} = 760 \text{ mmHg} = 1,01325 \text{ bar}$$

$$1 \text{ l} \cdot \text{atm} = 101325 \text{ J} = 1,01325 \cdot 10^5 \text{ J}$$

ENTALPIA

a p costante $\Delta H = q_p$ - a V costante $\Delta E = q_v$
 W_{exp}

$$\left. \begin{array}{l} \Delta H > \Delta E \text{ se forma gas} \\ \Delta H < \Delta E \text{ se consuma gas} \\ \Delta H = \Delta E \text{ se non cambia gas} \end{array} \right\} \Delta H = \Delta E + \Delta n_{\text{gas}} RT$$

LIBERA
 $\Delta G = \Delta H - T\Delta S$

EQUILIBRIO

$$K_p = K_c (RT)^{\Delta n}$$

$$\Delta G_{\text{reac}} = RT \ln \frac{Q}{K}$$

$$\Delta G^{\circ}_{\text{reac}} = -RT \ln K \quad \text{all'eq}$$

$$\ln K = -\frac{\Delta G^{\circ}}{RT} = -\frac{\Delta H^{\circ}}{RT} + \frac{\Delta S^{\circ}}{R}$$

ENTROPIA

$$S = k_B \ln \Omega \quad \Delta S = mR \ln \frac{V_2}{V_1} \quad \Delta S = mR \ln \frac{P_1}{P_2}$$

REVERSIBILI

$$\Delta E = 0 \quad q = -w$$

$$\Delta H = \Delta E + \Delta(mRT) = 0$$

$$P_{\text{est}} = P_{\text{int}} = \frac{nRT}{V}$$

$$\Delta S = \frac{q_{\text{rev}}}{T}$$

$$\Delta S = \frac{\Delta H}{T} \text{ a } P \text{ costante}$$

IRREVERSIBILI

$$P_{\text{est}} \neq P_{\text{int}}$$

$$|w_{\text{rev}}| > |w_{\text{irr}}| \quad q_{\text{rev}} > q_{\text{irr}}$$

$$\Delta S = C \ln \frac{T_2}{T_1}$$

$$\Delta S_{\text{tot}} = \Delta S_{\text{ist}} - \frac{\Delta H_{\text{ist}}}{T}$$

VANTHOFF

$$\ln \frac{K_2}{K_1} = -\frac{\Delta H^{\circ}}{R} \left(\frac{1}{T_1} - \frac{1}{T_2} \right)$$

D. STATO

$$\frac{\Delta S_{\text{th}}}{\Delta V_{\text{th}}} = \frac{\Delta H_{\text{th}}}{T \Delta V_{\text{th}}} = \frac{P \Delta H_{\text{th}}}{RT^2} \quad p = A \cdot e^{-\frac{\Delta H}{RT}} \quad V = c - f + 2 \quad \leftarrow \begin{array}{l} \circ \text{ se } 1 \text{ isolata} \\ \circ \text{ se } 2 \text{ isolate} \end{array}$$

HENRY

$$S = K_H \cdot P_x$$

RAOULT

$$P_{\text{tot}} = x_{A \text{ liq}} P_A^{\circ} + x_{B \text{ liq}} P_B^{\circ}$$

se B non volatile

$$\Delta P_A = x_B P_A^{\circ}$$

IDEALI SE

$$\Delta H_{\text{mix}} = 0$$

$$\Delta G_{\text{mix}} = -T \Delta S_{\text{mix}}$$

$$\Delta T_{\text{eb}} = K_{\text{eb}} m \quad m = \frac{\text{m soluto}}{\text{m solvente}} \quad \text{f di dissociazione}$$

$$\Delta T_{\text{cong}} = K_{\text{c}} m$$

$$\pi = \frac{n}{V} RT$$

SOLUBILITA' + ACIDI e BASI

$$K_{\text{sp}} = \frac{[A^+][B^-]}{AB_{\text{sol}}}$$

$$S_{\text{mol/e}} = [A^+] = [B^-] = (K_{\text{sp}})^{1/2}$$

$$K_w = [H_3O^+][OH^-] = K_a K_b$$

$$pH = pK_a - \log \frac{[\text{Acido}]}{[\text{Base coniugata}]}$$

$$[H^+] = K_a \cdot \frac{C_a}{C_s}$$

$$[OH^-] = \sqrt{C_s \frac{K_w}{K_a}} \quad \left| \begin{array}{l} \text{DILUZIONI} \\ M_1 V_1 = M_2 V_2 \end{array} \right.$$

ELETTROCHIMICA

$$W_{\text{elet}} = -Q \Delta E$$

$$W_{\text{elet}} = -i t \Delta E$$

$$Q = I t$$

$$\Delta G = -m F E_{\text{cell}}$$

NERNST

$$\Delta E = \Delta E^{\circ} - \frac{RT}{nF} \ln Q$$

A 25°

$$\Delta E = \Delta E^{\circ} - \frac{0,059}{n} \log Q$$

RIDUZIONE GENERALE

$$E = E^{\circ} - \frac{0,059}{n} \log \frac{[\text{Red}]^a}{[\text{Ox}]^a}$$

CINETICA

I ordine $\ln [A]_t = -kt + \ln [A]_0 \rightarrow t_{1/2} = \frac{\ln 2}{k}$

II ordine $\frac{1}{[A]_t} - \frac{1}{[A]_0} = kt \rightarrow t_{1/2} = \frac{1}{k[A]_0}$

ARRHENIUS

$$k = A \cdot e^{-\frac{E_a}{RT}}$$

$$K_{\text{eq}} = \frac{\text{diretta}}{\text{inversa}}$$

$$\ln \frac{K_2}{K_1} = -\frac{E_a}{R} \left(\frac{1}{T_1} - \frac{1}{T_2} \right)$$