Formúlur og fastar sem gætu hjálpað til við úrlausn verkefna

$$\Delta H^\circ_{\text{rxn}} = \sum n_p \Delta H^\circ_{\text{f}}(\text{myndefni}) - \sum n_r \Delta H^\circ_{\text{f}}(\text{hvarfefni})$$

$$\Delta G^\circ_{\text{rxn}} = \sum n \Delta G^\circ_{\text{f}}(\text{myndefni}) - \sum m \Delta G^\circ_{\text{f}}(\text{hvarfefni})$$

$$KE = \frac{1}{2}mv^2$$

$$PV = nRT$$

$$\Delta E = q + w$$

$$w = -P\Delta V$$

$$\Delta H = \Delta E + P\Delta V$$

$$E = h\nu$$

$$\ln \frac{P_1}{P_2} = \frac{\Delta \text{H}^\circ_{\text{vap}}}{R}\left(\frac{1}{T_2} - \frac{1}{T_1}\right)$$

$$\pi = MRT$$

$$t_{1/2} = \frac{[A]_0}{2k} \quad \text{(0. stigs hvarf)}$$

$$[A]_t = -kt + [A]_0 \quad \text{(0. stigs hvarf)}$$

$$t_{1/2} = \frac{0,693}{k} \quad \text{(1. stigs hvarf)}$$

$$\ln [A]_t = -kt + \ln [A]_0 \quad \text{(1. stigs hvarf)}$$

$$t_{1/2} = \frac{1}{k\,[A]_0} \quad \text{(2. stigs hvarf)}$$

$$\frac{1}{[A]_t} = kt + \frac{1}{[A]_0} \quad \text{(2. stigs hvarf)}$$

$$\ln \frac{k_1}{k_2} = \frac{E_a}{R}\left(\frac{1}{T_2} - \frac{1}{T_1}\right)$$

$$k = Ae^{-E_a/RT}$$

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

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

$$\text{K}_\text{w} = \left[\text{H}^+\right]\left[\text{OH}^-\right]$$

$$\text{pH} = -\log\left[\text{H}^+\right]$$

$$\left[\text{H}^+\right] = 10^{-\text{pH}}$$

$$\text{pH} + \text{pOH} = 14,00$$

$$\text{pH} = \text{pK}_a + \log \frac{[\text{A}^-]}{[\text{HA}]}$$

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

$$\Delta G = \Delta G^\circ + RT \ln Q$$

$$\Delta G^\circ = -RT \ln K$$

$$E^\circ_{\text{cell}} = E^\circ_{\text{katóða}} - E^\circ_{\text{anóða}}$$

$$\Delta G^\circ = -nFE^\circ_{\text{cell}}$$

$$C = As$$

$$E^\circ_{\text{cell}} = \frac{RT}{nF} \ln K$$

$$\left(\textit{Við 298 K:} \quad E^\circ_{\text{cell}} = \frac{0,0591}{n} \log K\right)$$

$$E_{\text{cell}} = E^\circ_{\text{cell}} - \frac{RT}{nF} \ln Q$$

$$\left(\textit{Við 298 K:} \quad E_{\text{cell}} = E^\circ_{\text{cell}} - \frac{0,0591}{n} \log Q\right)$$

Klofnunarfastar sýra við 25°C

Nafn	Formúla	K_{a1}	K_{a2}	K_{a3}
Ediksýra	$HC_2H_3O_2$	$1,8 \times 10^{-5}$		
Arsensýra	H_3AsO_4	$5,6 \times 10^{-3}$	$1,8 \times 10^{-7}$	$3,0 \times 10^{-12}$
Arsensýrlingur	H_3AsO_3	$5,1 \times 10^{-10}$		
Ascorbic /C-vítamín	$HC_6H_7O_6$	$8,0 \times 10^{-5}$	$1,6 \times 10^{-12}$	
Bensósýra	$HC_7H_5O_2$	$6,3 \times 10^{-5}$		
Bórsýra	H_3BO_3	$5,8 \times 10^{-10}$		
Bútansýra	$HC_4H_7O_2$	$1,5 \times 10^{-5}$		
Kolsýra	H_2CO_3	$4,3 \times 10^{-7}$	$5,6 \times 10^{-11}$	
Klórediksýra	$HC_2H_3ClO_2$	$1,4 \times 10^{-3}$		
Klórsýrlingur	$HClO_2$	$1,1 \times 10^{-2}$		
Sítrónusýra	$H_3C_6H_5O_7$	$7,4 \times 10^{-4}$	$1,7 \times 10^{-5}$	$4,0 \times 10^{-7}$
Cýansýra	$HCNO$	$3,5 \times 10^{-4}$		
Maurasýra	$HCHO_2$	$1,8 \times 10^{-4}$		
Hýdróazósýra	HN_3	$1,9 \times 10^{-5}$		
Blásýra	HCN	$4,9 \times 10^{-10}$		
Flúrsýra	HF	$6,8 \times 10^{-4}$		
Vetniskrómatjón	$HCrO_4^-$	$3,0 \times 10^{-7}$		
Vetnisperoxíð	H_2O_2	$2,4 \times 10^{-12}$		
Vetnisselenatjón	$HSeO_4^-$	$2,2 \times 10^{-2}$		
Brennisteinsvetni	H_2S	$9,5 \times 10^{-8}$	1×10^{-19}	
Hypóbrómsýrlingur	$HBrO$	$2,5 \times 10^{-9}$		
Hypóklórsýrlingur	$HClO$	$3,0 \times 10^{-8}$		
Hypójoðsýrlingur	HIO	$2,3 \times 10^{-11}$		
Joðsýra	HIO_3	$1,7 \times 10^{-1}$		
Mjólkursýra	$HC_3H_5O_3$	$1,4x\ 10^{-4}$		
Malónsýra	$H_2C_3H_2O_4$	$1,5 \times 10^{-3}$	$2,0 \times 10^{-6}$	
Saltpétursýrlingur	HNO_2	$4,5 \times 10^{-4}$		
Oxalsýra	$H_2C_2O_4$	$5,9 \times 10^{-2}$	$6,4 \times 10^{-5}$	
Paraperjoðsýra	H_5IO_6	$2,8 \times 10^{-2}$	$5,3 \times 10^{-9}$	
Fenól (phenol)	HC_6H_5O	$1,3 \times 10^{-10}$		
Fosfórsýra	H_3PO_4	$7,5 \times 10^{-3}$	$6,2 \times 10^{-8}$	$4,2 \times 10^{-13}$
Própansýra	$HC_3H_5O_2$	$1,3 \times 10^{-5}$		
Pýrófosfórsýra	$H_4P_2O_7$	$3,0 \times 10^{-2}$	$4,4 \times 10^{-3}$	
Brennisteinssýra	H_2SO_4	Römm sýra	$1,2x\ 10^{-2}$	
Brennsisteinssýrlingur	H_2SO_3	$1,7 \times 10^{-2}$	$6,4 \times 10^{-8}$	
Tartarsýra eða vínsýra	$H_2C_4H_4O_6$	$1,0 \times 10^{-3}$	$4,6 \times 10^{-5}$	
Ammóníumjón	NH_4^+	$5,6 \times 10^{-10}$		
Metýlammóníumjón	$CH_3NH_3^+$	$2,3 \times 10^{-11}$		
Pýridíniumjón	$C_5H_5NH^+$	$5,9 \times 10^{-7}$		
Hýdroxýlammóníumjón	$OHNH_3^+$	$9,1 \times 10^{-7}$		

Tafla 20.1 Staðalafoxunarspenna í vatnlausn við 25°C	
Íspenna (V), $E°$	Afoxunar-hálfhvarf
+2,87	$F_2(g) + 2e^- \rightarrow 2\ F^-(aq)$
+1,51	$MnO_4^-(aq) + 8H^+(aq) + 5e^- \rightarrow Mn^{2+}(aq) + 4\ H_2O(l)$
+1,359	$Cl_2(g) + 2e^- \rightarrow 2\ Cl^-(aq)$
+1,33	$Cr_2O_7^{2-}(aq) + 14H^+(aq) + 6e^- \rightarrow 2\ Cr^{3+}(aq) + 7\ H_2O(l)$
+1,23	$O_2(g) + 4\ H^+(aq) + 4e^- \rightarrow 2\ H_2O(l)$
+1,065	$Br_2(l) + 2e^- \rightarrow 2\ Br^-(aq)$
+0,96	$NO_3^-(aq) + 4\ H^+(aq) + 3e^- \rightarrow NO(g) + 2\ H_2O(l)$
+0,799	$Ag^+(aq) + e^- \rightarrow Ag(s)$
+0,771	$Fe^{3+}(aq) + e^- \rightarrow Fe^{2+}(aq)$
+0,68	$O_2(g) + 2\ H^+(aq) + 2e^- \rightarrow H_2O_2(aq)$
+0,59	$MnO_4^-(aq) + 2\ H_2O(l) + 3e^- \rightarrow MnO_2(s) + 2\ H_2O(l)$
+0,54	$I_2(s) + 2e^- \rightarrow 2\ I^-(aq)$
+0,40	$O_2(g) + 2\ H_2O(l) + 4e^- \rightarrow 4\ OH^-(aq)$
+0,337	$Cu^{2+}(aq) + 2e^- \rightarrow Cu(s)$
0	$2\ H^+(aq) + 2e^- \rightarrow H_2(g)$
-0,28	$Ni^{2+}(aq) + 2e^- \rightarrow Ni(s)$
-0,440	$Fe^{2+}(aq) + 2e^- \rightarrow Fe(s)$
-0,763	$Zn^{2+}(aq) + 2e^- \rightarrow Zn(s)$
-0,83	$2\ H_2O(l) + 2e^- \rightarrow H_2(g) + 2\ OH^-(aq)$
-1,66	$Al^{3+}(aq) + 3e^- \rightarrow Al(s)$
-2,71	$Na^+(aq) + e^- \rightarrow Na(s)$
-3,05	$Li^+(aq) + e^- \rightarrow Li(s)$

Gildi nokkurra fasta

$c = 2{,}9979 \times 10^8 \frac{m}{s}$	$1F = 96485 \frac{C}{mól} = 96485 \frac{J}{Vmól}$
$h = 6{,}6261 \times 10^{-34} Js$	$1cal = 4{,}184 J$
$N = 6{,}02214 \times 10^{23}/mól$	$eðlisvarmivatns = 4{,}184 \frac{J}{gK}$
$e = 1{,}602 \times 10^{-19} C$	$R_H = 1{,}096776 \times 10^7 m^{-1}$
$1V = 1 \frac{J}{C}$	$1D = 3{,}34 \times 10^{-30} Cm$

Mismunandi mælieiningar þrýstings				
	atm	torr, mmHg	Pa	Bar
Loftþyngd, atm	1	760	$1{,}013 \cdot 10^5$	1,013
Torr, mmHg	$1{,}316 \cdot 10^{-3}$	1	$1{,}333 \cdot 10^2$	$1{,}333 \cdot 10^{-3}$
Paskal, Pa	$9{,}869 \cdot 10^{-6}$	$7{,}502 \cdot 10^{-3}$	1	$1{,}00 \cdot 10^{-5}$
bar	0,987	750,2	$1{,}00 \cdot 10^5$	1

Stærð gasfastans, R, í mismunandi einingum	
Gasfasti, R	**Eining**
0,08206	$L \cdot atm \cdot mól^{-1} \cdot K^{-1}$
8,314	$J \cdot mól^{-1} \cdot K^{-1}$
1,987	$cal \cdot mól^{-1} \cdot K^{-1}$
8,314	$m^3 \cdot Pa \cdot mól^{-1} \cdot K^{-1}$
62,36	$L \cdot torr \cdot mól^{-1} \cdot K^{-1}$

Lotukerfið