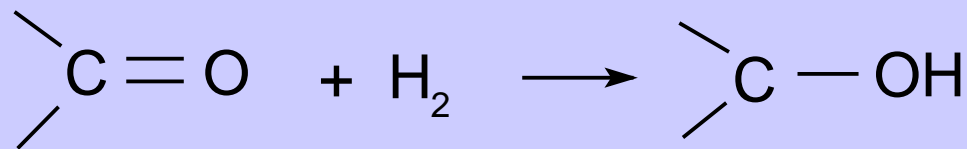
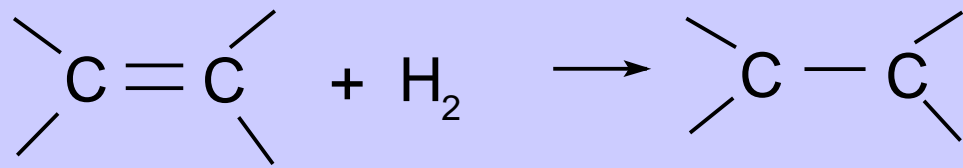


PREGLED REAKCIJA

- 17. $\text{H}_2 + \text{X}_2 \rightarrow 2\text{HX}$ $\text{X} = \text{F, Cl, Br, I}$
- 16. $2 \text{H}_2 + \text{O}_2 \rightarrow 2 \text{H}_2\text{O}$ S
- 15. $3 \text{H}_2 + \text{N}_2 \rightarrow 2 \text{NH}_3$ katalizator p, t
- 1,2. $2 \text{M} + x \text{H}_2 \rightarrow 2 \text{MH}_x$ $x = 1, 2$
- **Be, Mg ne reagiraju**
- $Y \text{H}_2 + \text{M}_x\text{O}_y \rightarrow x \text{M} + y \text{H}_2\text{O}$



KATALIZATOR
p, t

PLEMENITI PLINOVI

- $1s^2$ He
- ns^2np^6 Ne, Ar, Kr, Xe, Ra
- $t_{1/2} = 4 \text{ d}$
- U ZRAKU:
- Ar Ne He Kr Xe
- φ 0,99 $\sim 10^{-3}$ 5×10^{-4} 10^{-4} $\sim 10^{-7}$ %

18

He

Ne

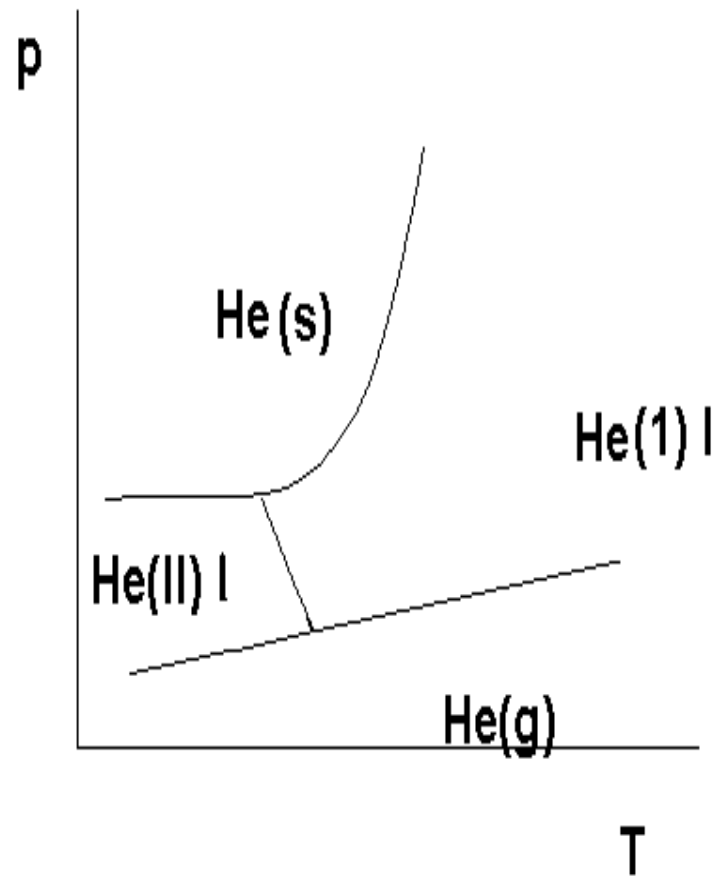
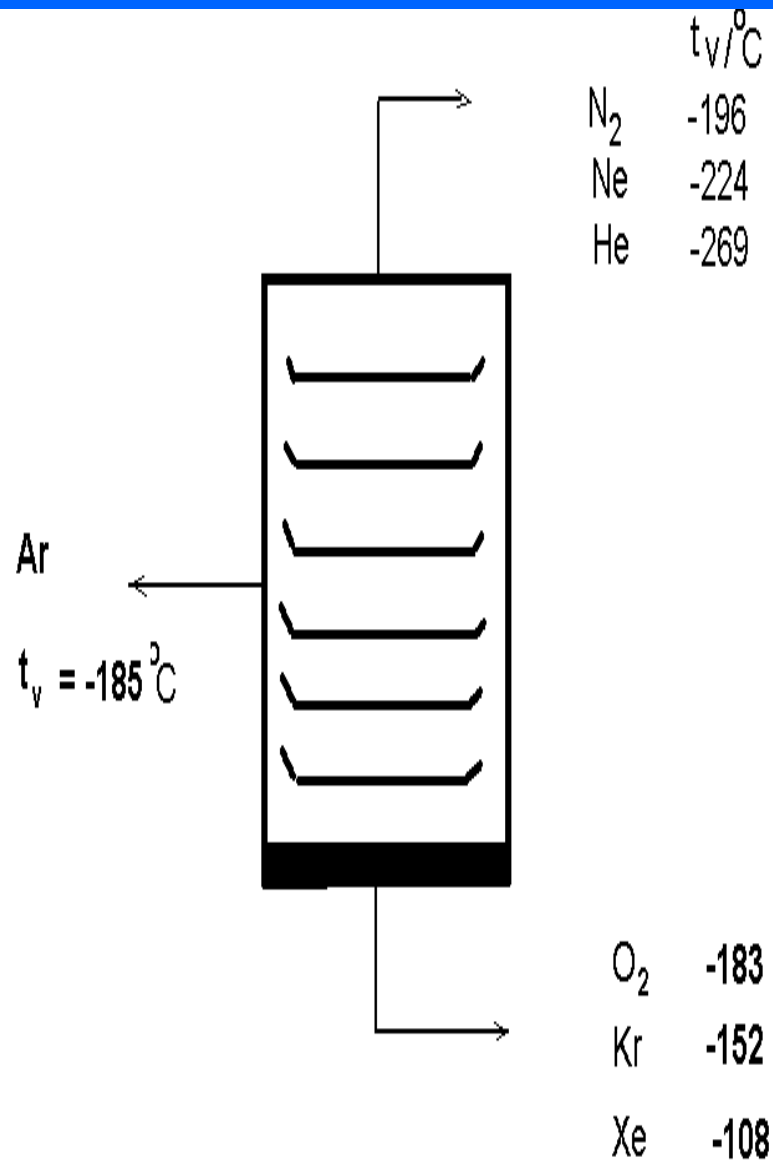
Ar

Kr

Xe

Rn

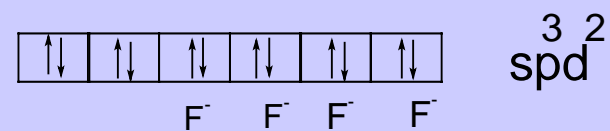
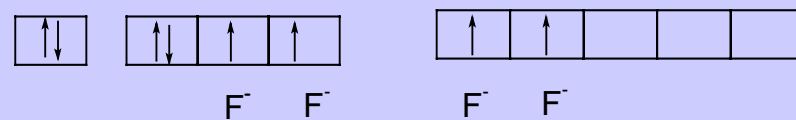
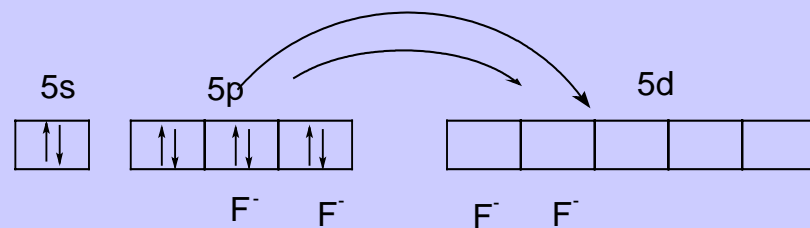
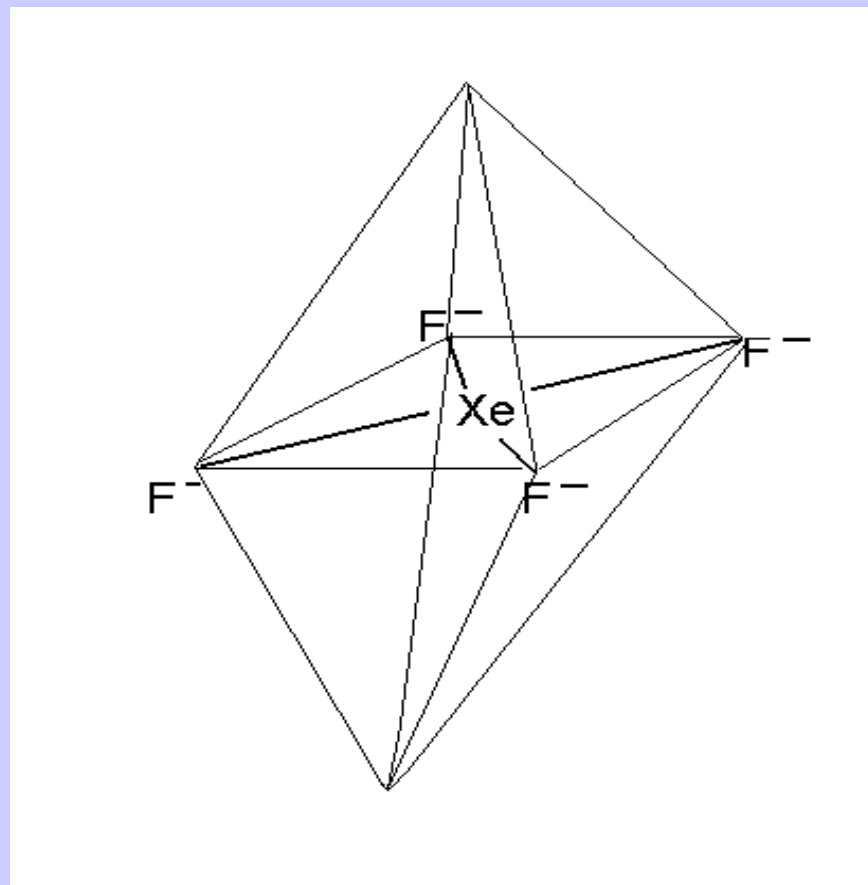
VIII



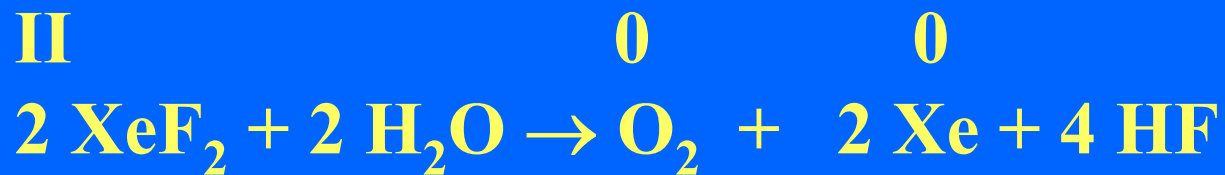
$\lambda (T= 2\text{K}, p = 1 \text{ bar})$

SPOJEVI

- He Ne Ar Kr Xe Ra
- E_i/eV 24,6 21,6 15,8 14 12,1 10,8
- $\text{O}_2 + \text{PtF}_6(\text{g}) \rightarrow \text{O}_2^+[\text{PtF}_6]^- (\text{s})$ (1962)
- $\text{O}_2 \rightarrow \text{O}_2^+ + \text{e}^-$ $E_i = 12,2 \text{ eV}$
- $\text{Xe} + \text{PtF}_6 (\text{g}) \rightarrow \text{Xe}^+[\text{PtF}_6]^- (\text{s})$
- žut



•KRUTINA $t_f = 100^\circ\text{C}$



IV

XeF_4 , XeF_6 disproportioniraju se u H_2O

VI

0

VIII



17. SKUPINA $ns^2 np^5$

	F	Cl	Br	I	At	
• E_i / eV	17,4	13	11,9	10,4		$x \rightarrow x^+ + e^-$
• $-E_a / \text{eV}$	3,45	3,61	3,36	3,07		$x + e^- \rightarrow x^-$
• <u>$E(\text{veze})$</u>						
• kJmol^{-1}	159	242	190	151		$x_2 \rightarrow 2x$
• <u>$-E(\text{hidr.})$</u>						
• kJmol^{-1}	506	376	343	297		$x^-(g) \rightarrow x^-(aq.)$
• E° / V	2,9	1,4	1,1	0,5		$x_2 + 2e^- \leftrightarrow 2x^-(aq.)$
• X	4	3	2,8	2,5		

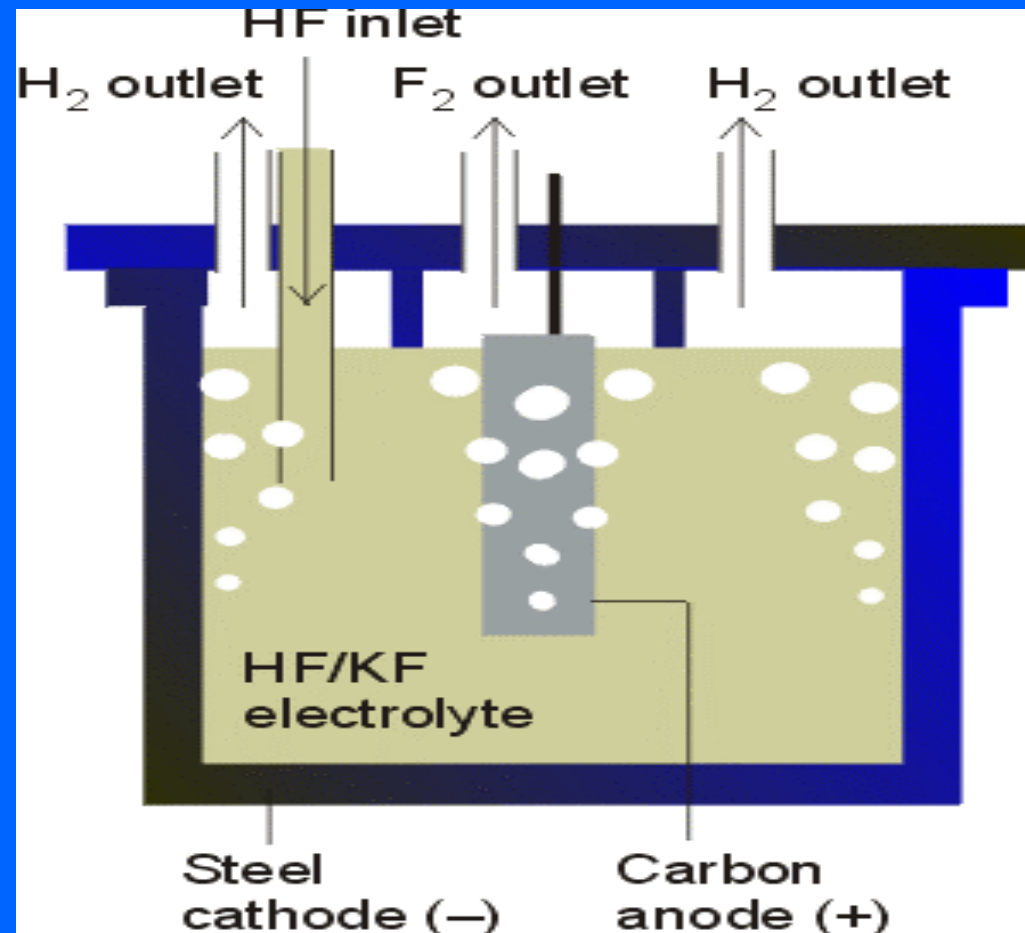
- $Cl_2(g) + 2e^- \rightarrow 2 Cl^-(aq), \Delta rH = - 1238 \text{ kJmol}^{-1}$
- $Cl_2(g) \rightarrow 2 Cl (g), \Delta rH = 242 \text{ kJmol}^{-1}$
- $2 Cl (g) + 2e^- \rightarrow 2Cl^- (g) \Delta rH = -728 \text{ kJmol}^{-1}$
- $2Cl^- (g) + aq. \rightarrow 2 Cl^-(aq) \Delta rH = \underline{-752kJmol}^{-1}$
- $ -1238 \text{ kJmol}^{-1}$
- $F_2(g) + 2e^- \rightarrow 2 F^- (aq) \Delta rH = -1388 \text{ kJmol}^{-1}$

ELEMENTARNE TVARI

	F_2	Cl_2	Br_2	I_2	
• $t_f/^\circ C$	-218,6	-101	-7,25	113,6	
• $t_v/^\circ C$	-188,1	-34	59,5	185,2	
• ρ /gcm^{-3}	1,51	1,66	3,19	3,96	
• <u>$l(x-x)s$</u>	149	198	227	272	pm

- **DOBIVANJE: A:** $2X^- - 2e^- \rightarrow X_2$
- **LAB.**
- $10Cl^- + 2MnO_4^- + 16H^+ \rightarrow 5Cl_2 + 2Mn^{2+} + 8H_2O$
- **FLUOR** CaF_2, Na_3AlF_6
- **OTROVAN**
- **REAKTIVAN**
- **DOB. ELEKTROLIZA HF · KF, 3 HF · KF**
- **(Cu, Ni)**
 - $HF + F^- \rightarrow HF_2^-$
 - **(KF)**

- **A:** $2\text{HF}_2^- \rightarrow 2\text{HF} + \text{F}_2 + 2\text{e}^-$
- **K:** $2\text{HF} + 2\text{e}^- \rightarrow \text{H}_2 + 2\text{F}^-$

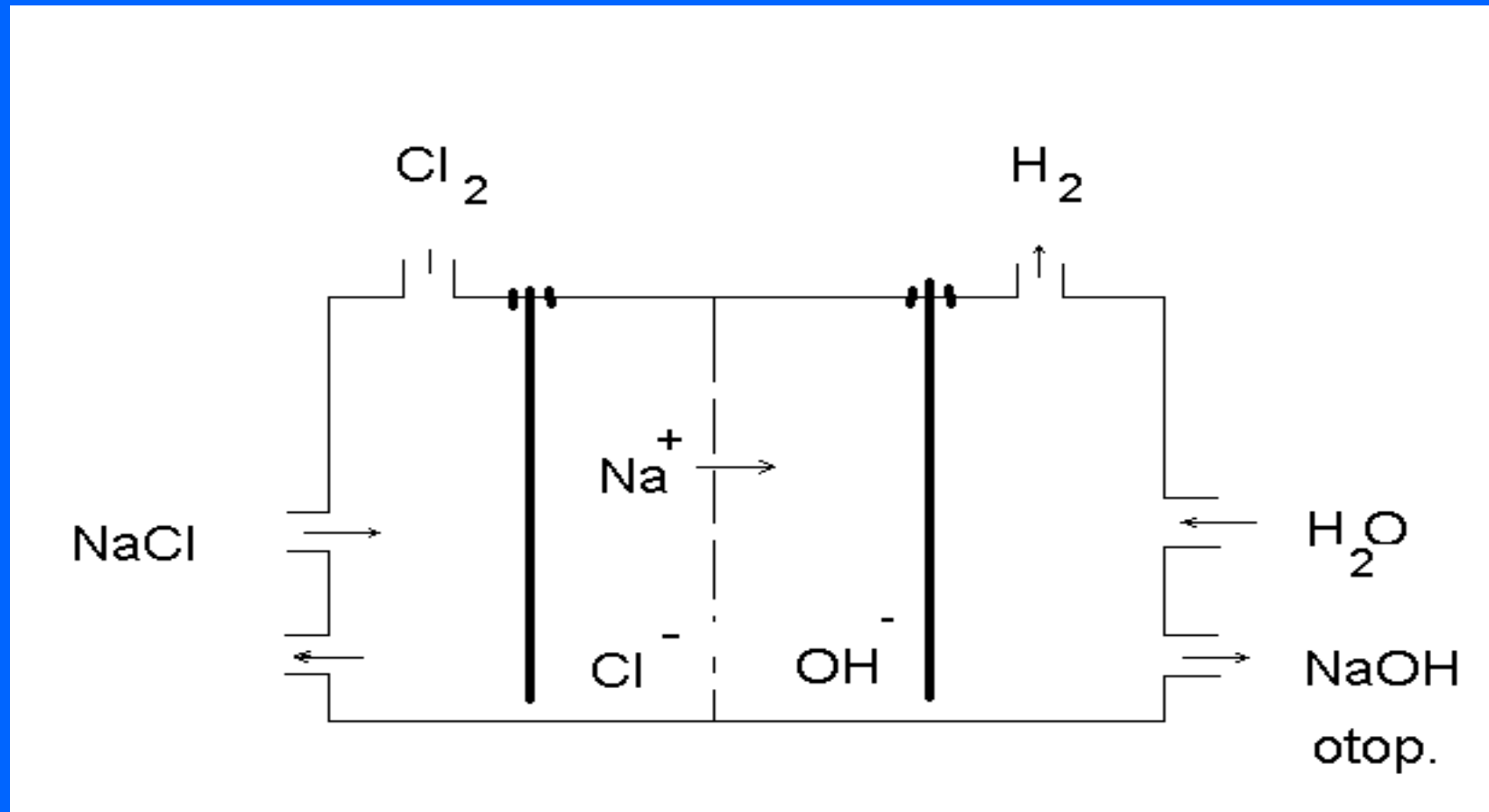


KLOR

- **IND. ELEKTROLIZA OTOP. NaCl**
- **A: $2 \text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}^-$ $E^\circ_{\text{R/O}} = -1.36 \text{ V}$**
- **$2\text{H}_2\text{O} \rightarrow \text{O}_2 + 4 \text{H}^+ + 4 \text{e}^-$ $E^\circ_{\text{R/O}} = -1,23 \text{ V}$**

- **$E_{\text{O/R}} = E^\circ_{\text{O/R}} - 0,059 \text{ V} \cdot \text{pH}$ $E_{1/2} \text{O}_2/\text{H}_2\text{O} = 1,23 \text{ V}$**
- **prenapon kisika je veći**
- **K: $2 \text{Na}^+ + 2\text{e}^- \rightarrow 2 \text{Na}$ $E^\circ_{\text{O/R}} = -2,7 \text{ V}$**
- **$2 \text{H}^+ + 2\text{e}^- \leftrightarrow \text{H}_2$ $E^\circ = 0 \text{ V}$**
- **$2 \text{H}_2\text{O} + 2\text{e}^- \leftrightarrow \text{H}_2 + 2 \text{OH}^-$ $E^\circ = -0,83$**
- **$E_{\text{O/R}} = E^\circ_{\text{O/R}} - 0,059 \text{ V} \cdot \text{pH}$ (25°C)**

Postupak dobivanja s: živom, dijafragmom, membranom



BROM u moru $w(\text{Br}) = 0,007 \%$



←

H^+

JOD NaIO_3 u prirodi



Pregled reakcija halogena

- $nX_2 + 2 M \rightarrow 2MX_n$ | praktički svi
| metali + P, As, Sb
- $X_2 + H_2 \rightarrow 2HX$
- $X_2 + H_2O \rightarrow 2H^+ + 2X^- + Y_2O_2$ F₂, (Cl₂)
- $X_2 + H_2O \rightleftharpoons H^+ + X^- + HOX$ osim F₂
- $X_2 + H_2S \rightleftharpoons S + 2 HX$ Cl₂, Br₂, I₂
- H₂O
- $3 X_2 + 8 NH_3 \rightarrow 6 NH_4X + N_2$ F₂, Cl₂, Br₂
- $3 I_2 + NH_3 \rightarrow NI_3 + 3 HI$
- $y X_2 + 2 MO_z + 2 zC \rightarrow 2 MX_y + 2_z CO$

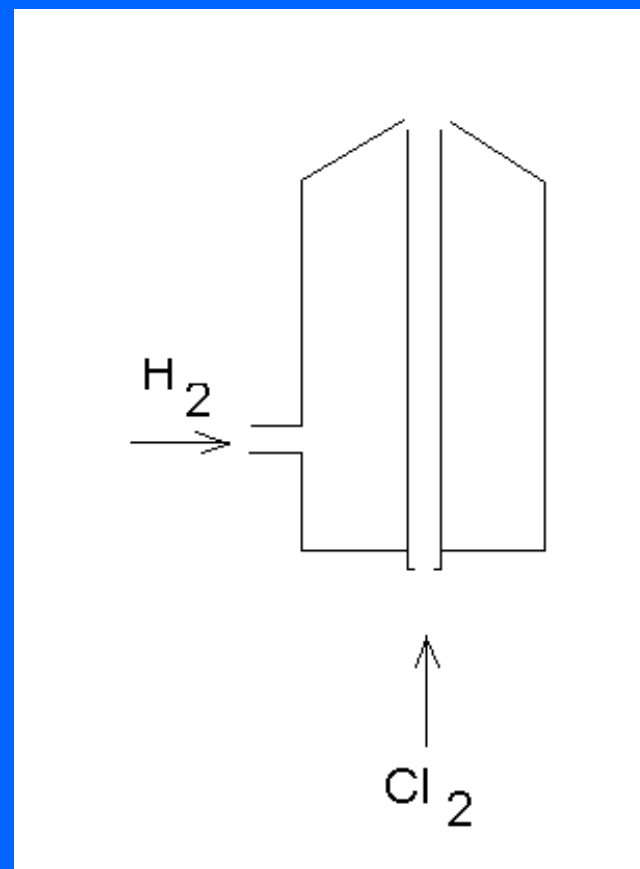
SPOJEVI

- STABILNI SPOJEVI
- oksidacijski broj:



OKSIDACIJSKI BROJ: -I

- **KISELINE:**
- **HF, HCl, HBr, HI**
- **→**
- **JAKOST**
- **DOB:-DIREKTNA SINTEZA**
- $\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}$
- $\text{H}_2 + \text{Br}_2 \xrightarrow{\text{Pt}} 2\text{HBr}$
- $\text{H}_2 + \text{I}_2 \xrightarrow{200^\circ\text{C}} 2\text{HI}$



-IZ SOLI



- $2 \text{HI} + \text{H}_2\text{SO}_4 \rightarrow \text{I}_2 + \text{SO}_2 + 2 \text{H}_2\text{O}$
- $\text{I}_2 + \text{SO}_2 + 2 \text{H}_2\text{O} \rightarrow 2 \text{HI} + \text{H}_2\text{SO}_4$
- $3 \text{KI} + \text{H}_3\text{PO}_4 \rightarrow 3 \text{HI (g)} + \text{K}_3\text{PO}_4$
- $2 \text{P} + 3 \text{I}_2 \rightarrow 2 \text{PI}_3$
- $\text{PI}_3 + 3 \text{H}_2\text{O} \rightarrow \text{H}_3\text{PO}_3 + 3 \text{HI}$
(Br₂, Cl₂)
- $\text{HX (g)} + \text{H}_2\text{O} \rightarrow \text{H}_3\text{O}^+ + \text{X}^-$

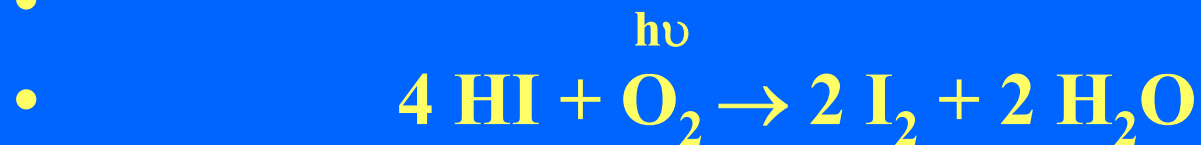
- **KIS:**
- **HF**, $w(\text{HF}) \sim 0,4$
- **$\text{SiO}_2 + 4 \text{HF} \rightarrow \text{SiF}_4(\text{g}) + \text{H}_2\text{O}$**
- **HCl**, $w(\text{HCl}) = 0,36$
- $\rho = 1,19 \text{ gcm}^{-3}$ $\varphi(\text{HCl}(\text{g})) \text{ 5 ppm}$

- **HBr**

-

- **HI**

-



-



The End

