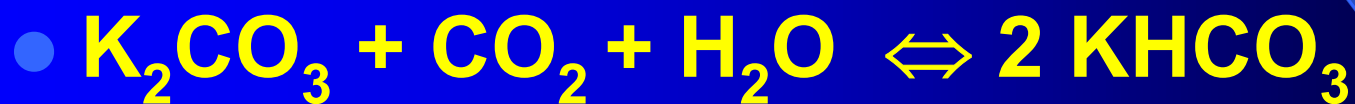
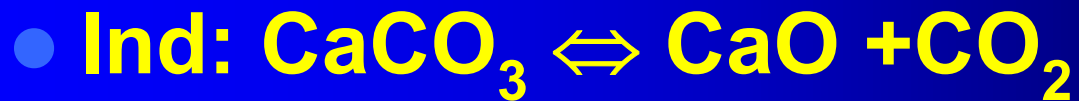
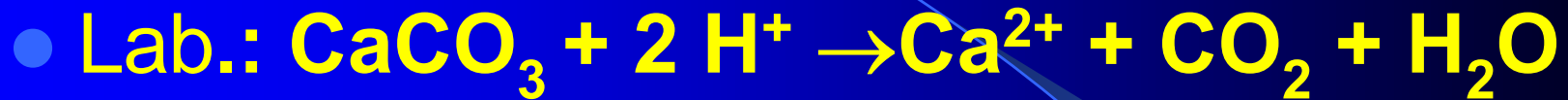


IV

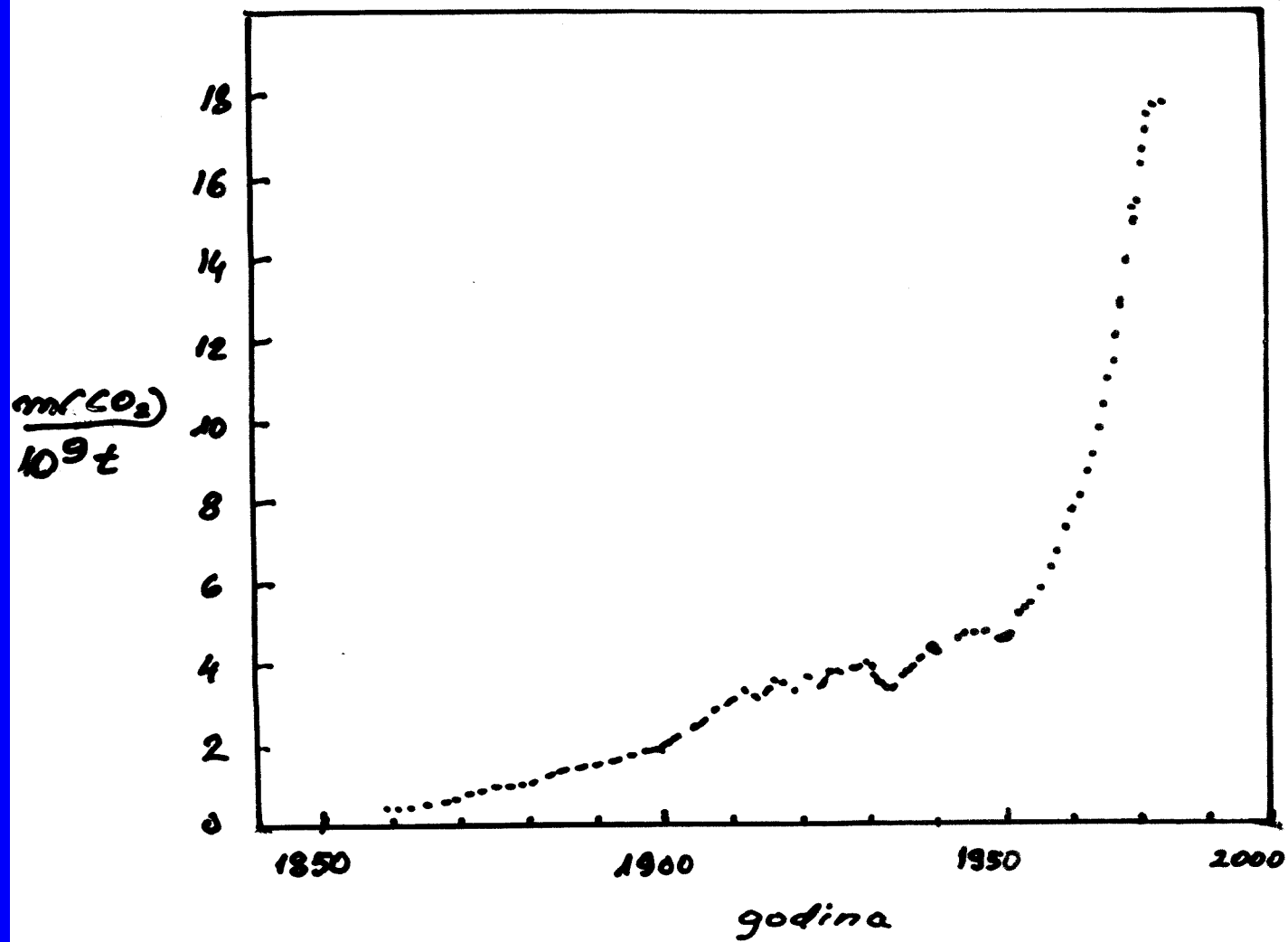
•	CO_2	H_2CO_3	sol
•	SiO_2	H_4SiO_4	sol
•	GeO_2	(H_4GeO_4)	sol
•	SnO_2	$\leftarrow (\text{Sn}(\text{OH})_4)$	sol
•	PbO_2	?	sol

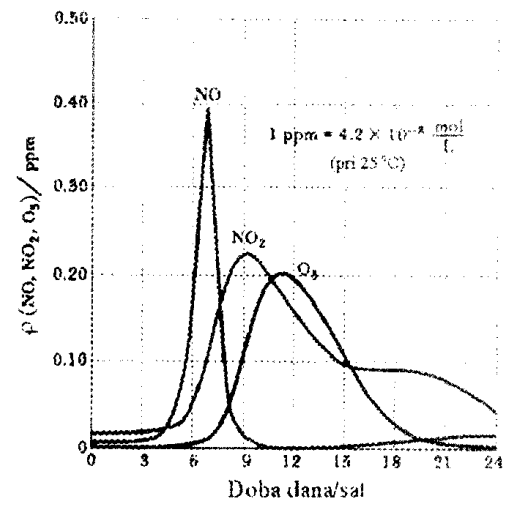
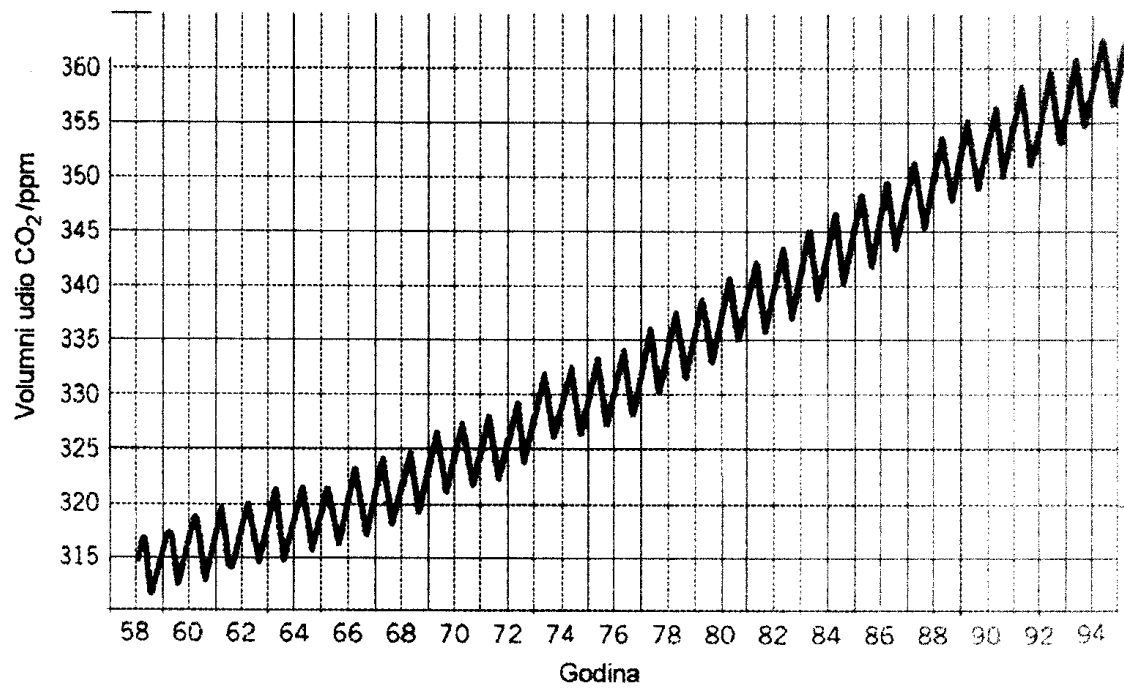
- CO₂ Dobivanje



kuhanje





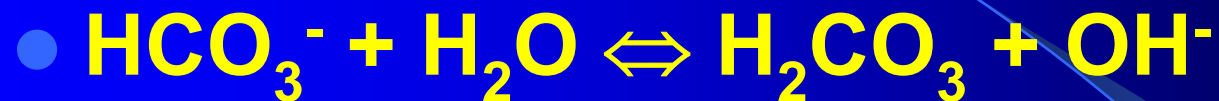
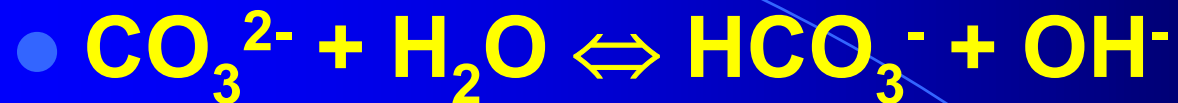




- $K_1 = \frac{[\text{H}^+][\text{HCO}_3^-]}{[\text{H}_2\text{CO}_3]} \approx 1 \cdot 10^{-4} \text{ mol/L}$

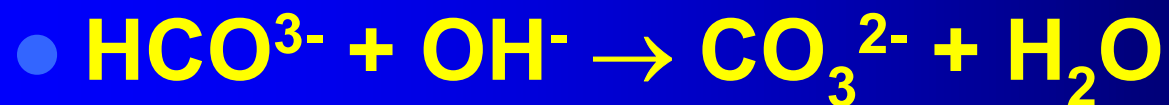
- $K_1 = \frac{[\text{H}^+][\text{HCO}_3^-]}{[\text{CO}_2]} \approx 3 \cdot 10^{-7} \text{ mol/L}$

- $K_2 = \frac{[\text{H}^+][\text{CO}_3^{2-}]}{[\text{HCO}_3^-]} \approx 5 \cdot 10^{-11} \text{ mol/L}$



-

grijanje

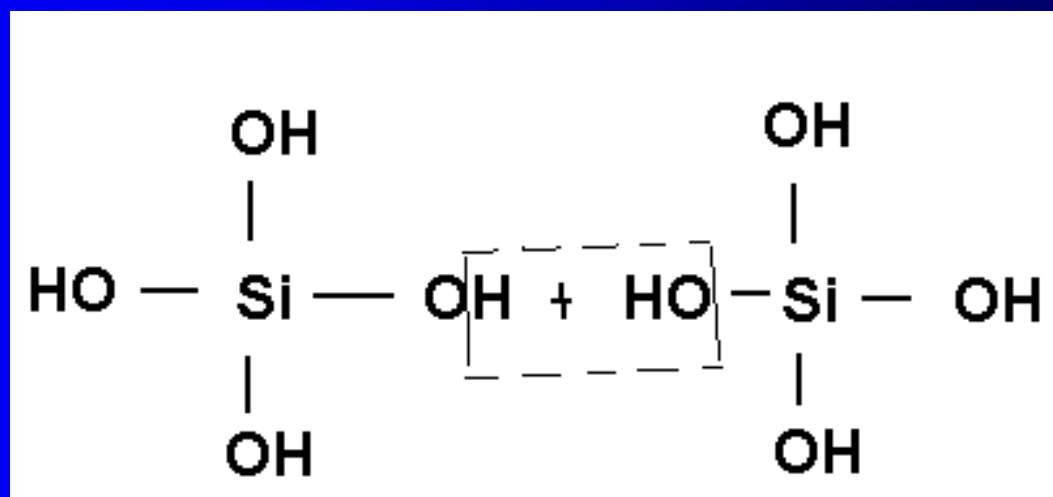
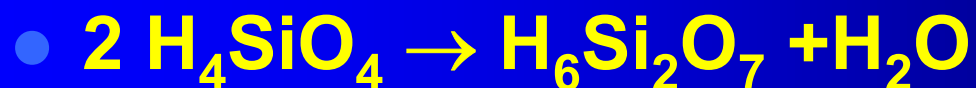
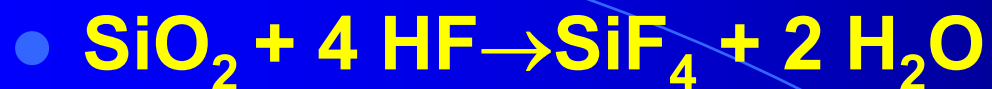


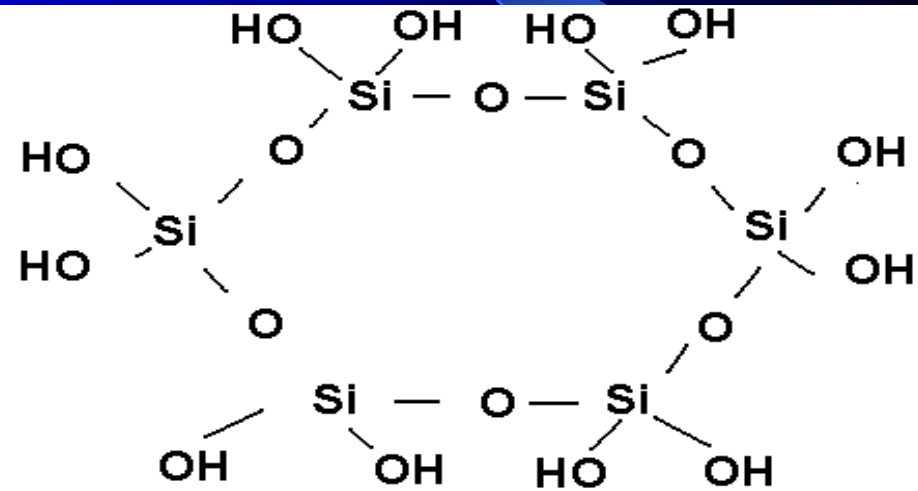
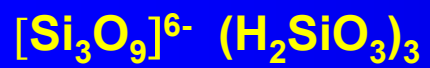
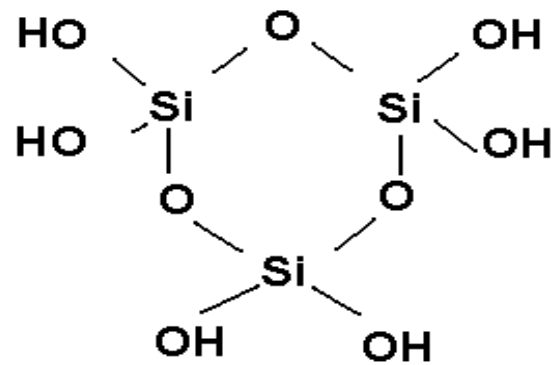
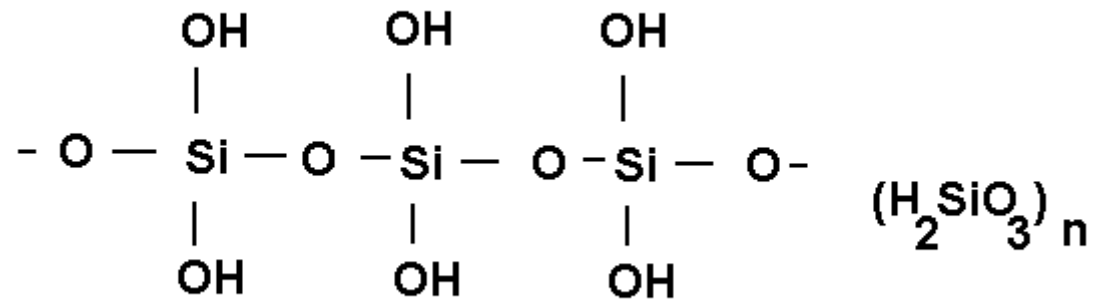
• Solvayev postupak

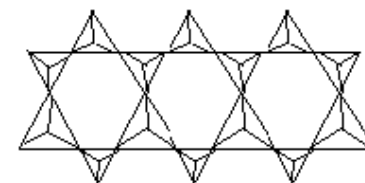
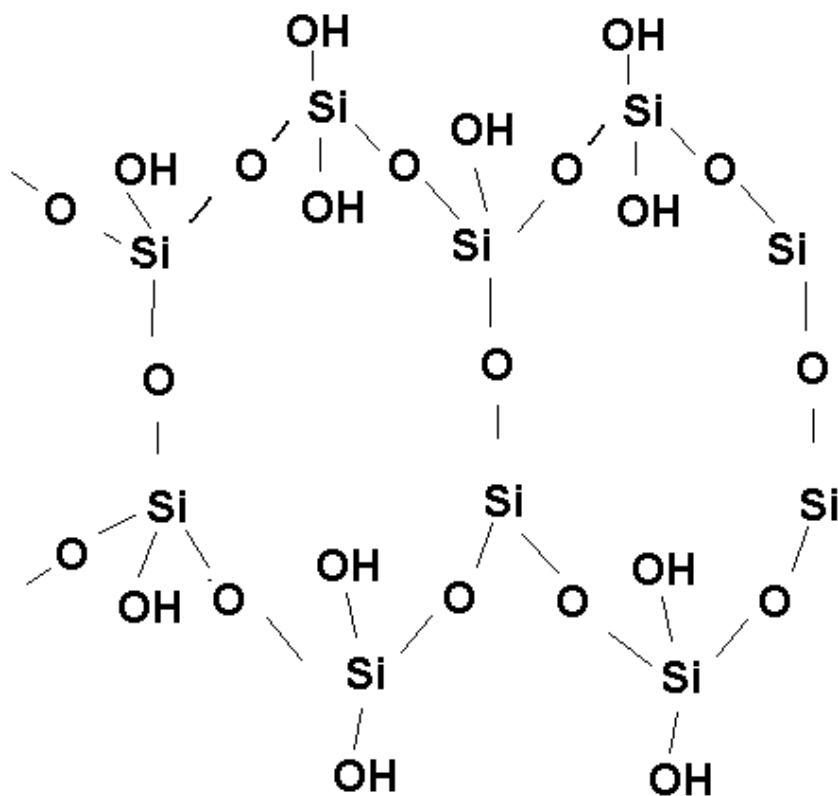
- $\text{NaCl} \rightarrow \text{Na}^+ + \text{Cl}^-$
- $\text{NH}_3 + \text{H}_2\text{O} \rightarrow \text{NH}_4^+ + \text{OH}^-$
- $\text{CO}_2 + \text{OH}^- \rightarrow \text{HCO}_3^-$
- $\text{Na}^+ + \text{HCO}_3^- \rightarrow \text{NaHCO}_3(\text{s})$
- $2 \text{NaHCO}_3 \rightarrow \text{Na}_2\text{CO}_3 + \text{CO}_2 + \text{H}_2\text{O}$
- $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$
- $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca}^{2+} + 2 \text{OH}^-$
- $2 \text{NH}_4^+ + 2 \text{Cl}^- + \text{Ca}^{2+} + 2 \text{OH}^- \rightarrow 2 \text{NH}_3 + 2 \text{H}_2\text{O} + \text{Ca}^{2+} + 2 \text{Cl}^-$

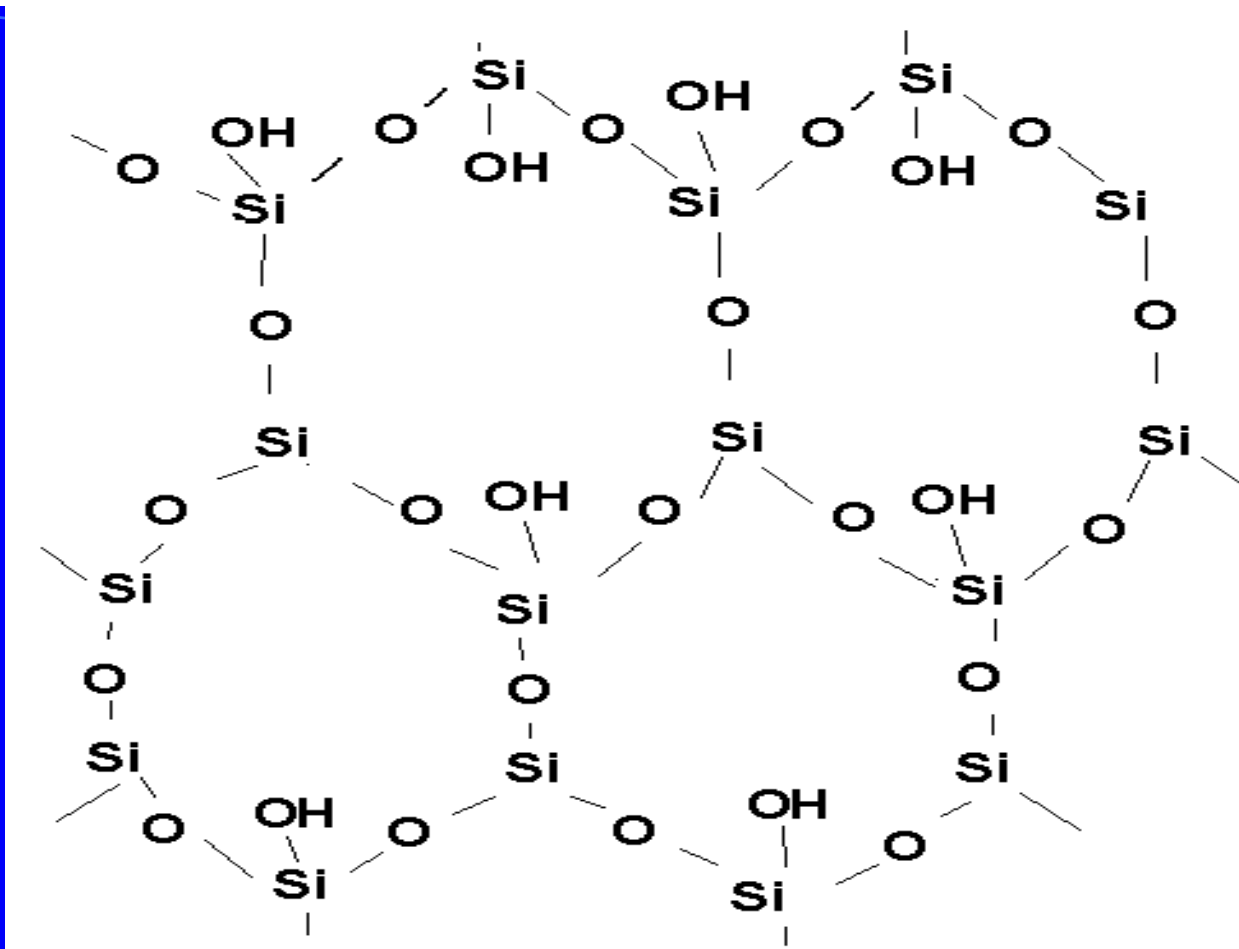
- $\text{K}^+ + \text{OH}^- + \text{CO}_2 \rightarrow \text{KHCO}_3$
- $2 \text{KHCO}_3 \rightarrow \text{K}_2\text{CO}_3 + \text{CO}_2 + \text{H}_2\text{O}$
- $\text{C} + 2 \text{S} \rightarrow \text{CS}_2$
- $2 \text{CS}_2 + 5 \text{O}_2 \rightarrow 2 \text{CO} + 4 \text{SO}_2$
- $\text{CS}_2 + 3 \text{Cl}_2 \rightarrow \text{CCl}_4 + \text{S}_2\text{Cl}_2$

- IV Si









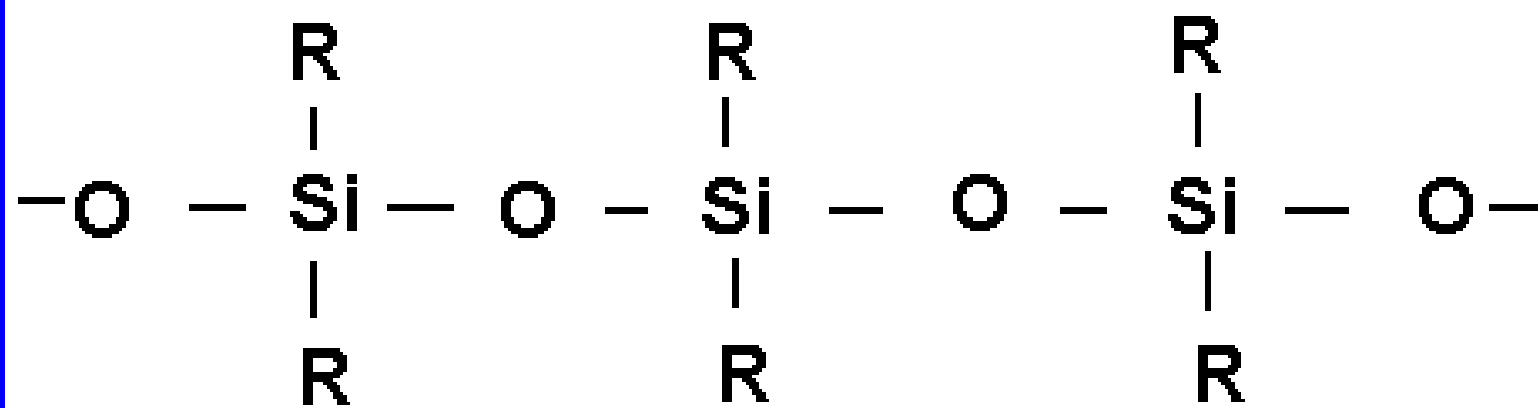


- $x \text{H}_4\text{SiO}_4 \rightarrow (\text{H}_2\text{SiO}_3)_x$ $x : y = 1 : 1$
- $(\text{H}_6\text{Si}_4\text{O}_{11})_n$ $x : y = 4 : 5$
- $(\text{H}_2\text{Si}_2\text{O}_5)_n$ $x : y = 2 : 3$
- $(\text{SiO}_2)_n$ $x : y = 1 : 2$

- $\text{SiO}_2 + \text{Na}_2\text{CO}_3 \rightarrow \text{Na}_2\text{SiO}_3 + \text{CO}_2$
- $2 \text{SiO}_2 + \text{Na}_2\text{CO}_3 \rightarrow \text{Na}_2\text{Si}_2\text{O}_5 + \text{CO}_2$
- $\text{Na}^+ + \text{SiO}_3^{2-} + \text{H}^+ + \text{Cl}^- \rightarrow \text{H}_2\text{SiO}_3 + 2 \text{Na}^+ + 2 \text{Cl}^-$

- $\text{SiO}_2 + 2 \text{C} + 2 \text{Cl}_2 \rightarrow \text{SiCl}_4 + 2 \text{CO}$

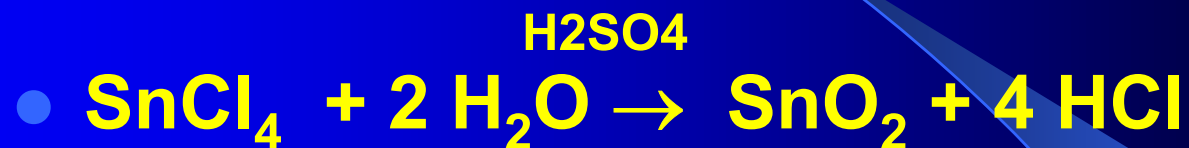
- $\text{RSiCl}_3, \quad \text{R}_2\text{SiCl}_2, \quad \text{R}_3\text{SiCl}$
- $\text{R}_2\text{SiCl}_2 + 2 \text{H}_2\text{O} \rightarrow \text{R}_2\text{Si}(\text{OH})_2 + 2 \text{HCl}$
- $n (\text{R}_2\text{Si}(\text{OH})_2 \rightarrow (\text{R}_2\text{SiO})_n + n \text{H}_2\text{O}$



- **IV Sn**



-



- **SnCl_4 « spiritus fumans Libavi »**



-

«pinkova sol»

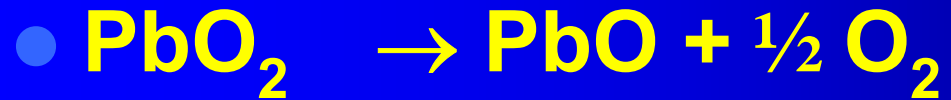


-

«musivno zlato»

- **IV Pb**

- **200°C**

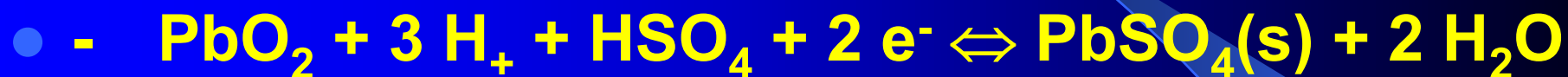


- **konc**

- Dob. PbO₂



- Akumulator



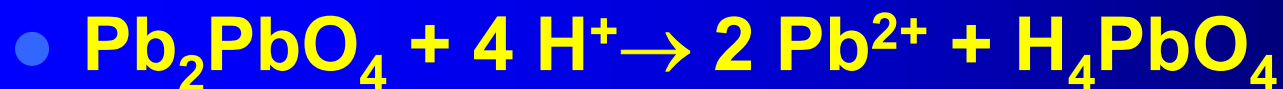
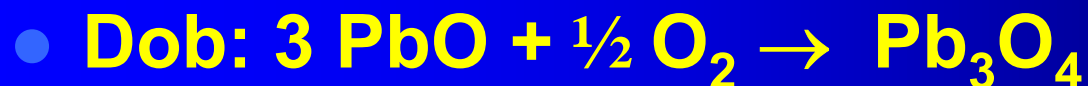
-

- Minij



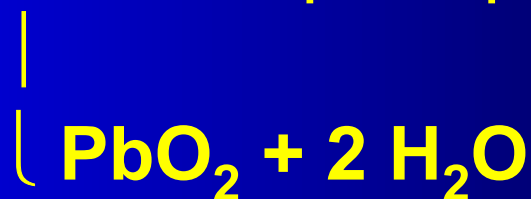
-

500°C



-

-



13 SKUPINA



	B	Al	Ga	In	Tl
• E_i/eV	8.3	6	6	5.8	6.1
• χ	2.0	1.5	1.6	1.7	1.8
• $E^0_{III/I}/\text{V}$		-1.66	-0.53	-0.34	+0.7



- Raste energija hidratacije

ELEMENTARNE TVARI

- B kernit $\text{Na}_2\text{B}_4\text{O}_7 \cdot 4 \text{H}_2\text{O}$
-
- Boraks $\text{Na}_2[\text{B}_4\text{O}_5(\text{OH})_4] \cdot 8 \text{H}_2\text{O}$
- Stara formula : $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10 \text{H}_2\text{O}$
- Dob: $\text{Na}_2\text{B}_4\text{O}_7 \xrightarrow{\text{H}^+ \text{ grijanje}} \text{H}_3\text{BO}_3 \rightarrow \text{B}_2\text{O}_3$
-
- $\text{B}_2\text{O}_3 + 3 \text{Mg} \xrightarrow{1900^\circ\text{C}} 2 \text{B} + 3 \text{MgO}$

-
- $$\begin{array}{c} \text{Ta} \\ 2 \text{ BBr}_3 + \text{H}_2 \rightarrow 2 \text{ B} + 6 \text{ HBr} \\ 1200^\circ\text{C} \end{array}$$
-
- $$2 \text{ Cu}_2\text{O} + 2 \text{ B} \rightarrow 6 \text{ Cu} + \text{B}_2\text{O}_3$$

- Al

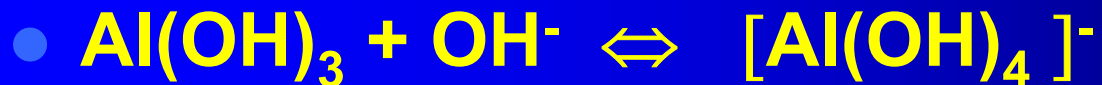
- Boksit: $\text{AlO}(\text{OH})$ [bemit
- [dijaspor

- $\text{Al}(\text{OH})_3$ hidrargilit

- Dob Al: dobivanje čistog Al_2O_3
- Elektroliza taline

- Bayerov postupak

- 160 °C, 3.5 MPa



- Razr



- 1200°C



- Crveni mulj: sastav (suhe tvari)

- w (Fe₂O₃) do 0.6

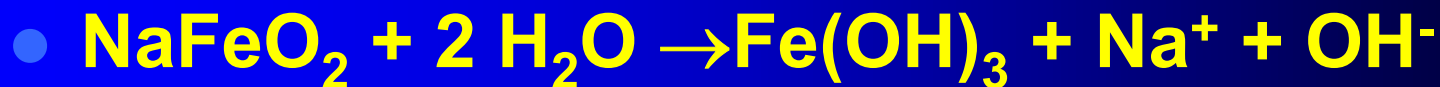
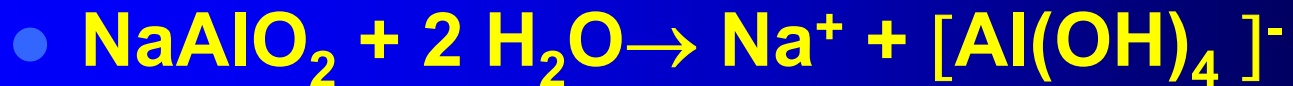
- w (Al₂O₃) do 0.2

- w (TiO₂) do 0.1

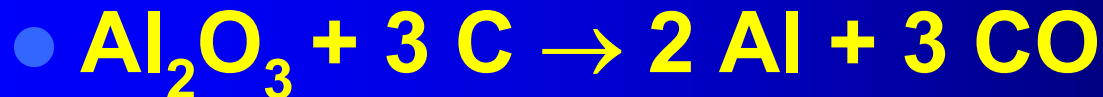
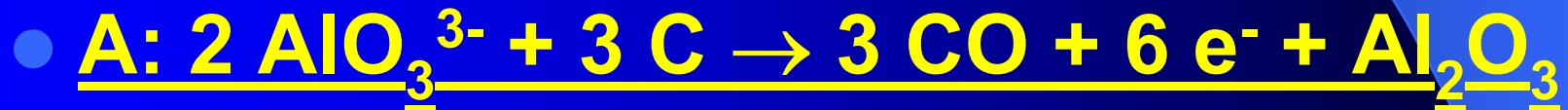
- Ostatak Na₂O i SiO₂

- Suhi postupak:

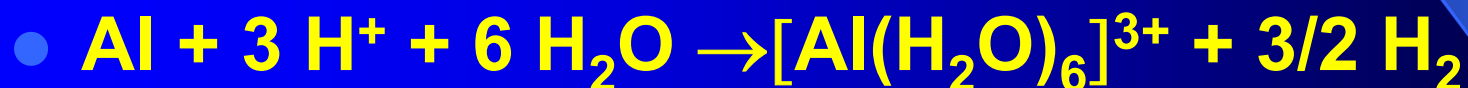
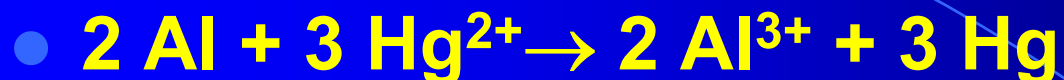
- 1873 Le Chatelier



- ***Redukcija glinice***



- Kem. Svojstva



Pregled reakcija

- $2 M + 3 X_2 \rightarrow 2 MX_3$ osim TlX
- X = halogen
- $3 M + 3 O_2 \rightarrow 2 M_2O_3$ osim TlO_2
- $2 M + 3 S \rightarrow M_2S_3$ Tl_2S kod viših temp.
- $2 M + N_2 \rightarrow 2MN$ samo B, Al kod viših t.
- $2 M + 6 H^+ \rightarrow 2 M^{3+} + 3 H_2$ Al, Ga, In, Tl $\rightarrow Tl^+$
- $M + OH^- + 3 H_2O \rightarrow [M(OH)_4]^- + 3/2 H_2$, Al, Ga

SPOJEVI:

- I TI
- III B, Al, Ga, In
- Negativni stupanj oksidacije - *boridi*
- $\text{TiB}_2, \text{ZrB}_2 \leftarrow t_t = 3000^\circ\text{C}$