

V



sol

P



sol

As



sol

Sb

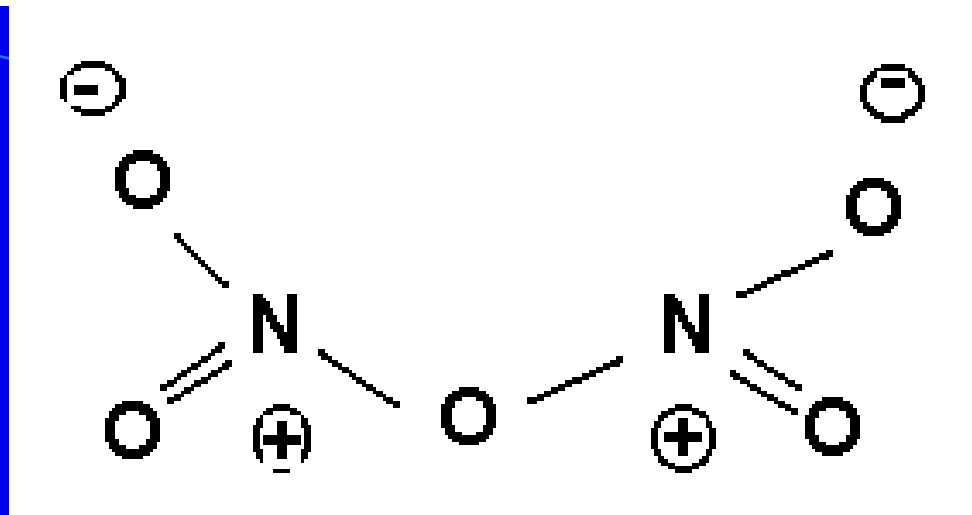


sol

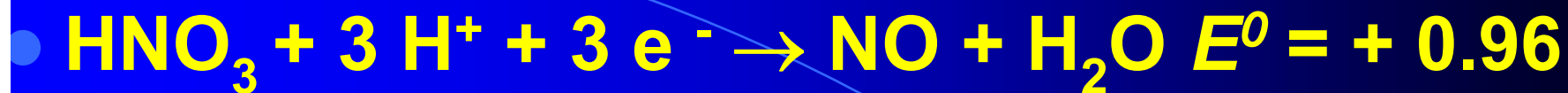
Bi

?

sol



- $\text{N}_2\text{O}_5 (\text{s}) \rightarrow \text{N}_2\text{O}_4 + \frac{1}{2} \text{O}_2$
- $\text{N}_2\text{O}_5 + \text{H}_2\text{O} \rightarrow 2 \text{HNO}_3$
- $3 \text{NO}_2 + \text{H}_2\text{O} \rightarrow 2 \text{HNO}_3 + \text{NO}$ *dob. dušične kis.*
- $2 \text{NO} + \text{O}_2 \rightarrow 2 \text{NO}_2$
- $2 \text{HNO}_3 \rightarrow \text{H}_2\text{O} + 2 \text{NO}_2 + \frac{1}{2} \text{O}_2$
- (čista)
- $\text{HNO}_3 + \text{H}^+ + \text{e}^- \rightarrow \text{NO}_2 + \text{H}_2\text{O}$ $E^0 = + 0.79 \text{ V}$
- (konc.)



- (razr.)

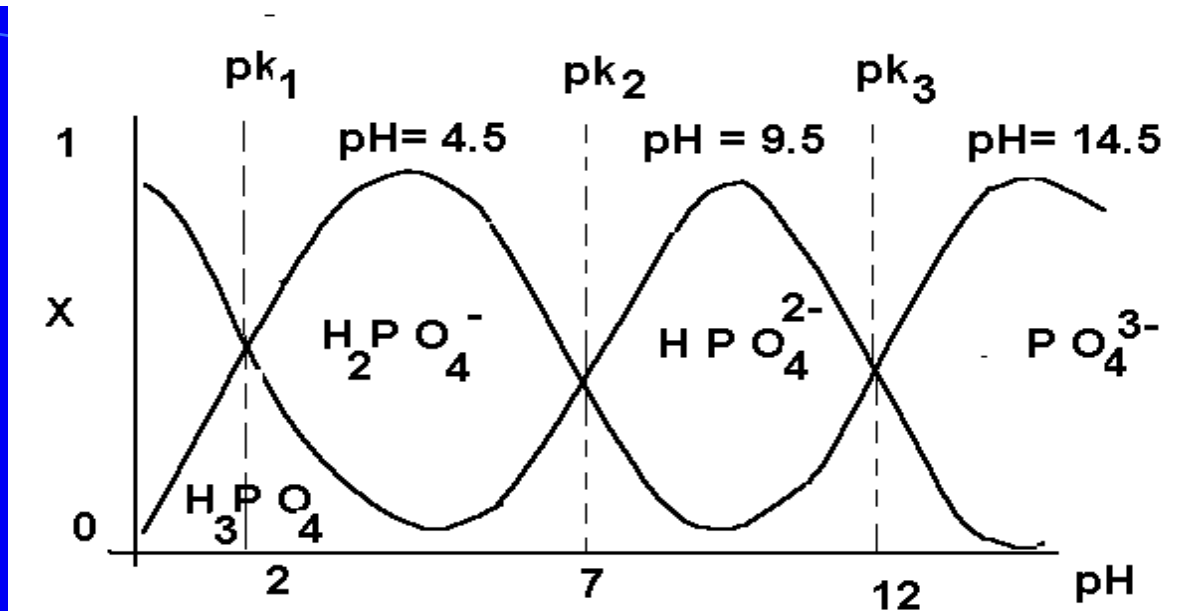


- 0





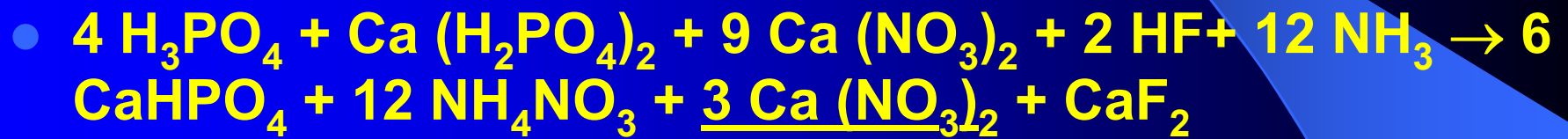
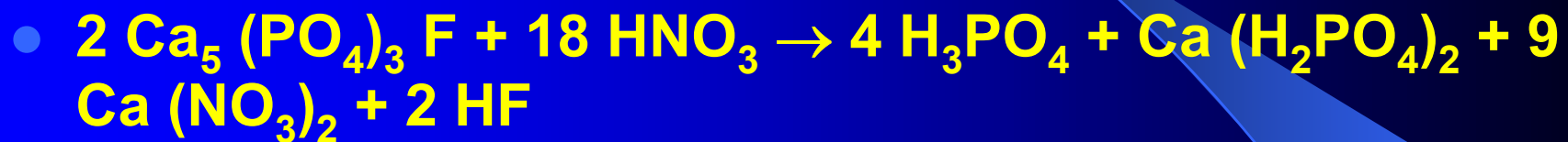
-



- $H_2PO_4^- \rightarrow H^+ + HPO_4^{2-}$ $K_A \approx 10^{-7} \text{ mol/L}$
- *Kis.*
- $H_2PO_4^{2-} + H_2O \rightarrow H_3PO_4 + OH^-$ $K_B \approx 10^{-12} \text{ mol/L}$
- *Baza*
- $H_3PO_4 \rightarrow H^+ + H_2PO_4^-$ $K_A = 10^{-2} \text{ mol/L}$



- 1.



- \downarrow

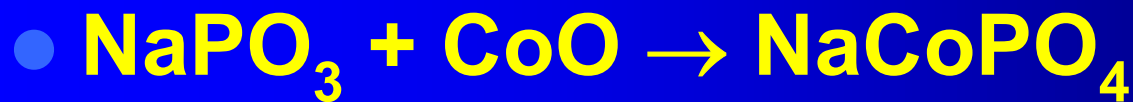
- odvojiti frakc. Krist.

- 2.

- Smjesa + $\text{CO}_2 \rightarrow$ gnojivo (CaCO_3)

- (+ HNO_3)

● 3.



● modar



● trifosfat

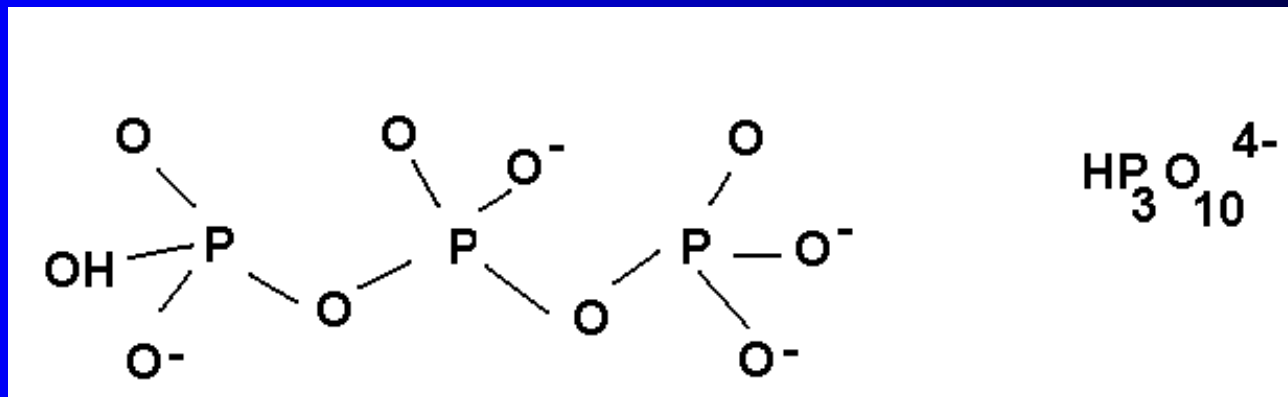
- 550 °C
- $3 \text{ NaH}_2\text{PO}_4 \rightarrow \text{Na}_3\text{P}_3\text{O}_9 + 3 \text{ H}_2\text{O}$

trimetafosfat

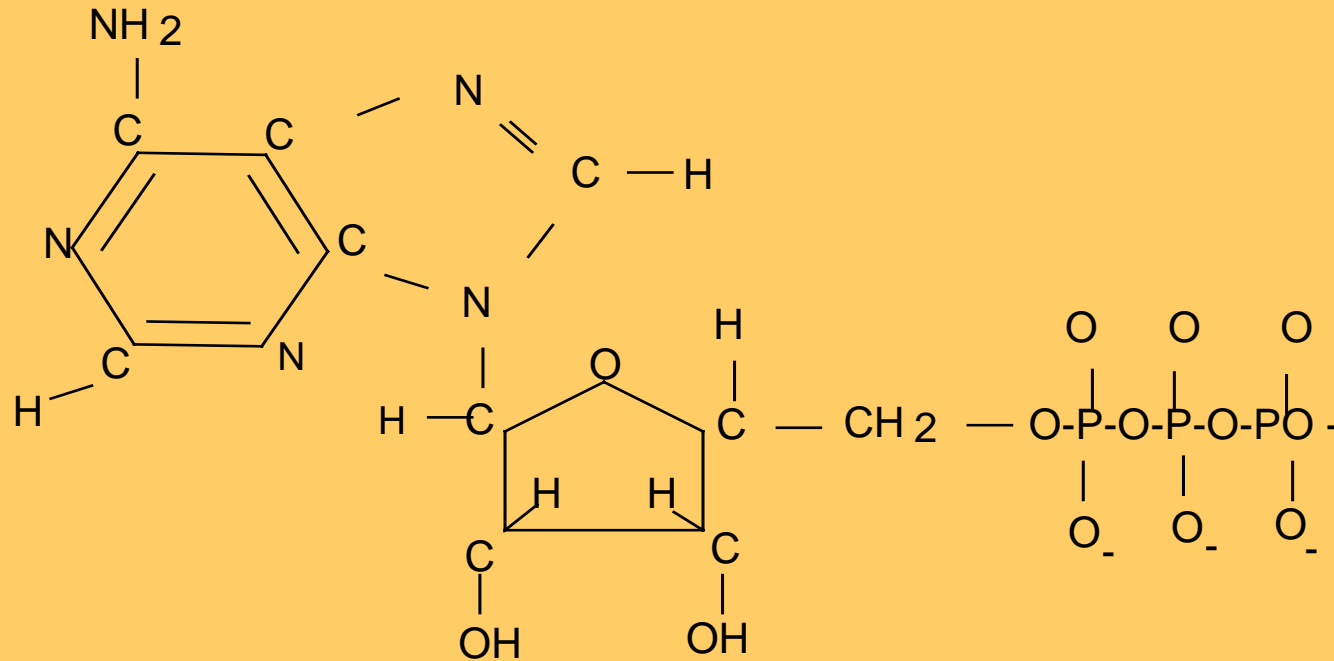
620 °C

- $\text{Na}_3\text{P}_3\text{O}_9 \rightarrow (\text{NaPO}_3)_n$
- Grahamova sol, $n \approx 1000$
- «kalgon»

– trifosfat- ion



ATP



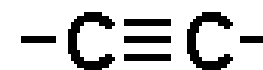
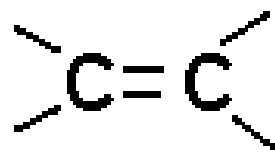
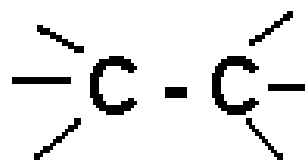
Adenozin

trifosfat

- $\text{ATP}^{4-} + \text{H}_2\text{O} \rightarrow \text{ADP}^{3-} + \text{HPO}_4^{2-} + \text{H}^+$
- Pri $\text{pH} = 7.4 \quad \Delta G^0 = -41 \text{ kJ/mol}$

14 SKUPINA ns^2np^2

—	C	Si	Ge	Sn	Pb
• E_i/eV	11.3	8.2	8.1	7.3	7.4
• χ	2.5	1.8	1.8	1.8	1.8
• $E_{\text{IV/II}}^0$			-0.2	0.15	1.5 V
• $E_{\text{II/0}}^0$	0.2	-0.86	-0.1	-0.14	-0.13 V



- **kJ/mol 334**

615

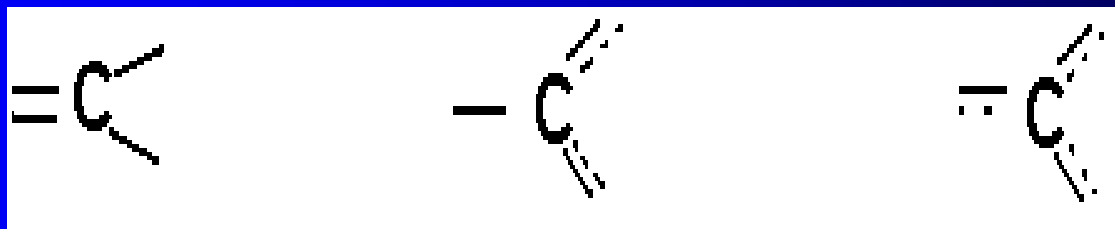
841

-

- **1**

x 1,84

x 2.52



- **sp³**

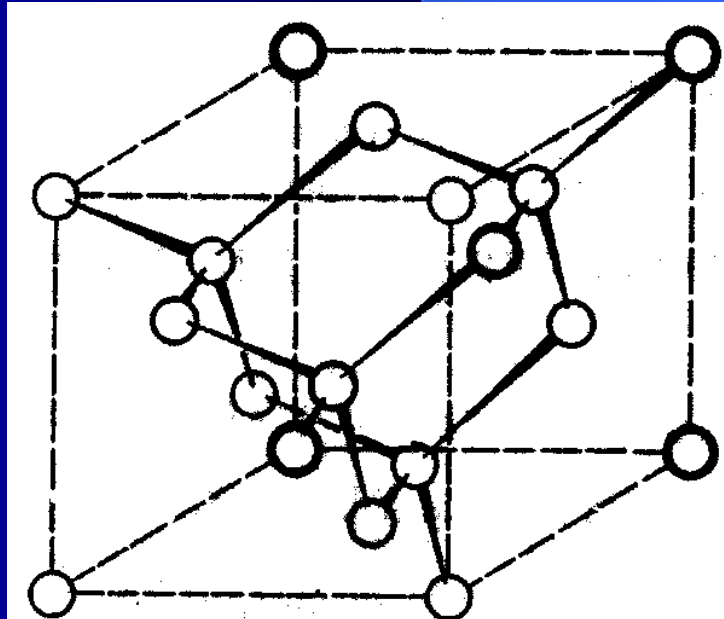
sp²

sp

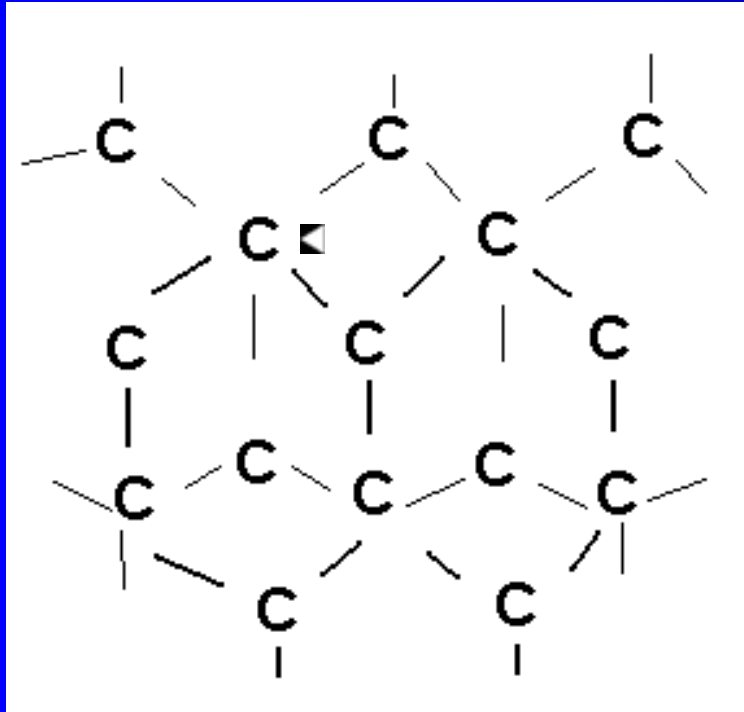
ELEMENTARNE TVARI

- | | C | Si | Ge | Sn | Pb | |
|------------------------|-----------------|------|----|-----|--------------|-----|
| $T_f / ^\circ\text{C}$ | 3550 | 1420 | | 959 | 232 | 327 |
| | kovalentna veza | | | | met. Rešetka | |

- **Dijamant**
- $\rho = 3.51 \text{ g/cm}^3$, $\Delta_f H^0 = 2.1 \text{ kJ/mol}$

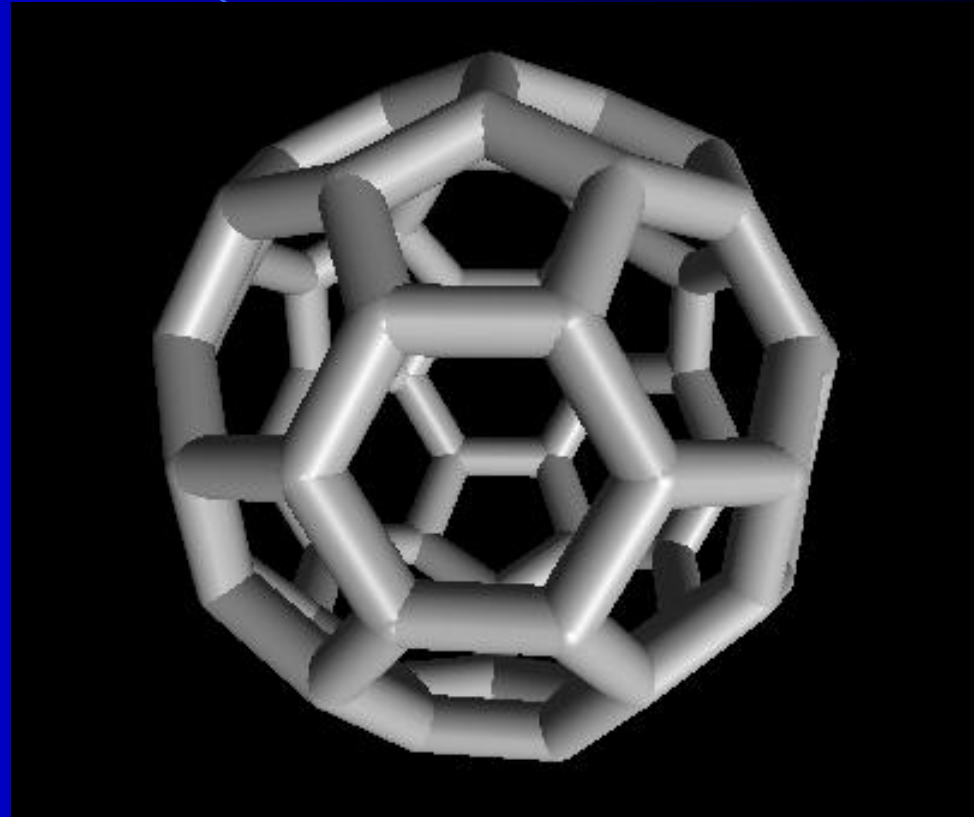


GRAFIT

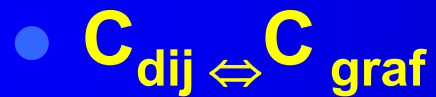


- $\rho = 2,27 \text{ g/mol}$
- $\Delta_r H^\circ = 0 \text{ kJ/mol}$

FULLERENE



C₆₀

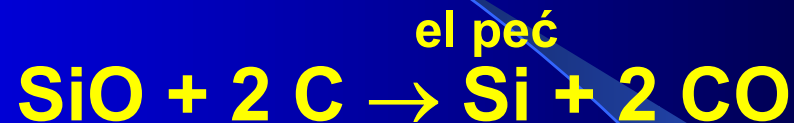


$$\Delta_r H = - 2.1 \text{ kJ/mol}$$

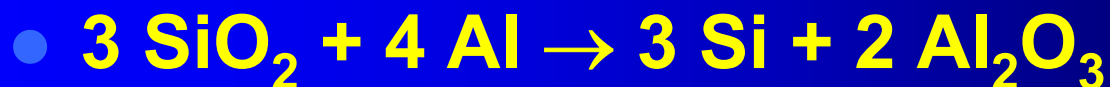
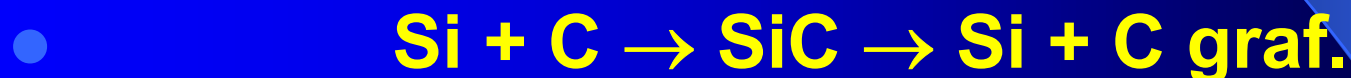
- grafit

-

- **Dob:**



- (Achenson)



- višak

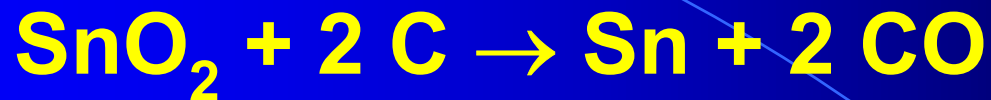
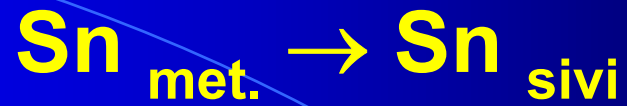


- zonsko taljenje

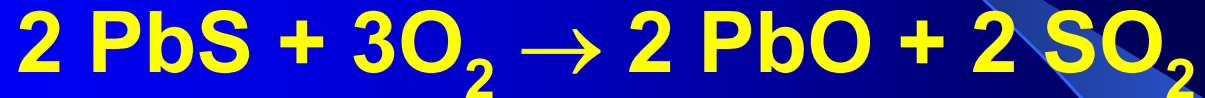
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- **FEROSILICIJ**

Sn:

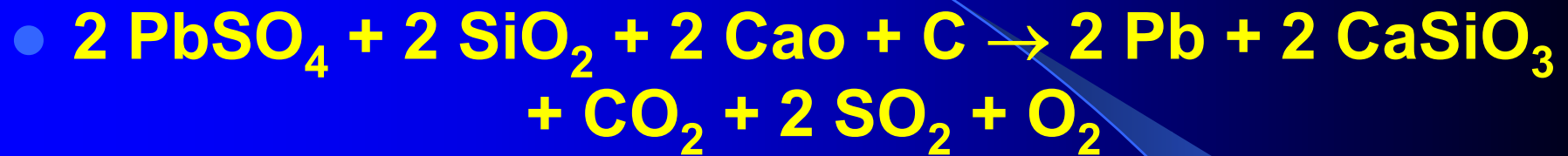


Pb:



/





- **//**



- **a)**



- **b)**



PREGLED REAKCIJA

- $M + 2 X_2 \rightarrow MX_4$, PbI_2 , osim C
- $M + O_2 \rightarrow MO_2$, PbO, Pb_3O_4
- $M + 2 S \rightarrow MS_2$ PbS
- $M + 2 H^+ \rightarrow M^{2+} + H_2$, samo Pb, Sn
- $3 M + 4 HNO_3 \rightarrow 3 MO_2 + 4 NO + 2 H_2O$, Pb^{2+}
- $M + 2 OH^- + H_2O \rightarrow MO_3^{2-} + 2 H_2$ samo Si, Ge



topljiv



- **IV**

- **Karbidi** **(-IV do I)**

- **Silicidi**

- **Organski spojevi ugljika**

- **Karbidi :**

- - ***solnog karaktera***

- -

- - **I i II** **Al_4C_3 (CH_4)**

- - **Na_2C_2 , CaC_2 , Mg_2C_3**

- - **C_2H_2** **C_3H_4**

- ***kovalentnog karaktera***

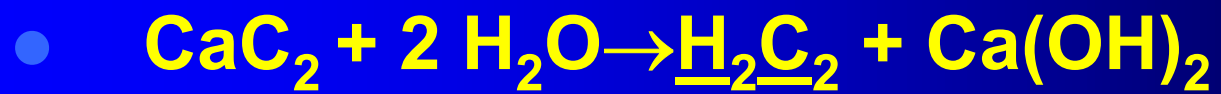
- **SiC**

- **B_4C** **struktura dijamanta**

- metalni karbidi
- WC, W₂C, Fe₃C



- CaC₂



● **Silicidi** $\text{CaSi}_2, \text{Ca}_2\text{Si}_2, \text{Ca}_2\text{Si}$

● **Silani** $\text{Si}_n\text{H}_{2n+2}$

● $\text{CaO} + 2 \text{SiO}_2 + 5 \text{C} \rightarrow \text{CaSi}_2 + 5 \text{CO}$

● $\text{Ca}_2\text{Si}_2 + 3 \text{O}_2 \rightarrow \text{CaSiO}_3$

● **Silikokalcij**

● $\text{Mg}_2\text{Si} + 4 \text{HCl} \rightarrow \text{MgCl}_2 + \text{SiH}_4$

● Si_2H_6

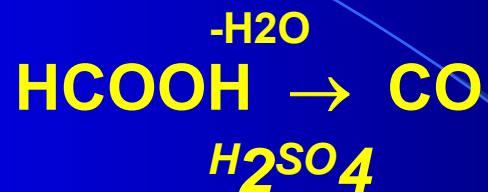
● Si_3H_8

● $\text{SiH}_4 + 2 \text{O}_2 \rightarrow \text{SiO}_2 + 2 \text{H}_2\text{O}$

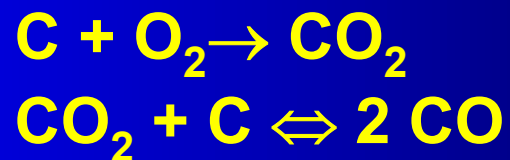
- II CO
- -vrlo otrovan

- Dobivanje:

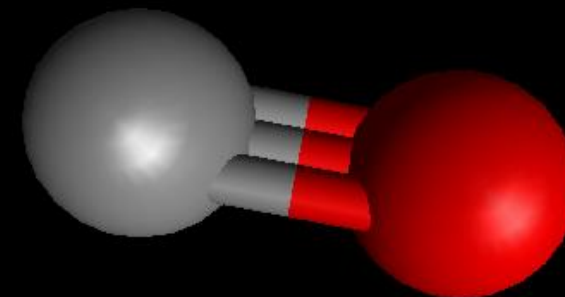
- Lab.



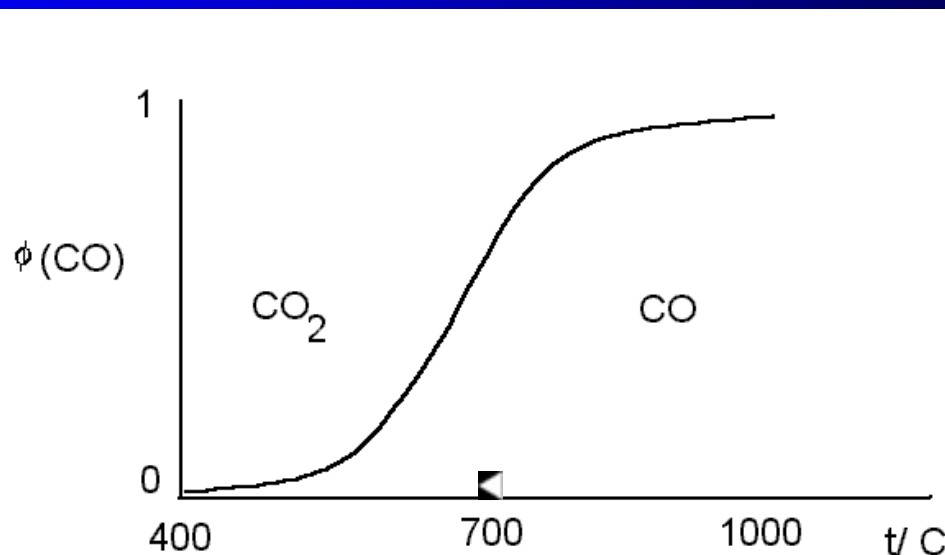
- Industrijsko:



- BOUDOURDOVA RAVNOTEŽA



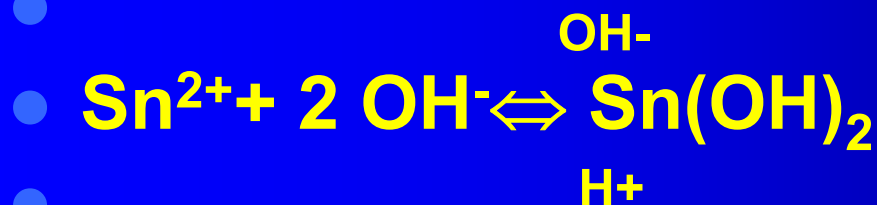
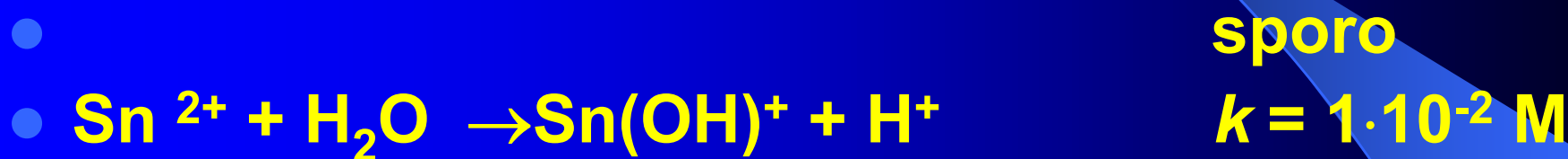
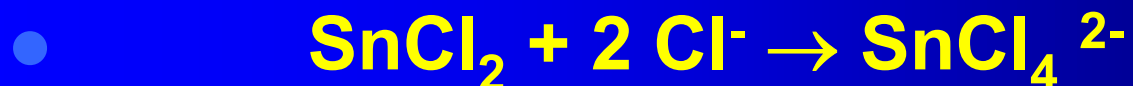
$\Delta_r H > 0$

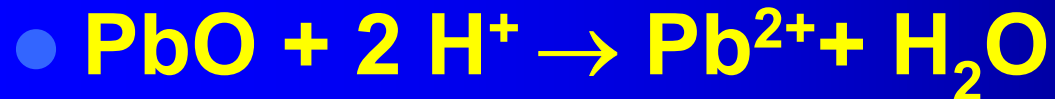
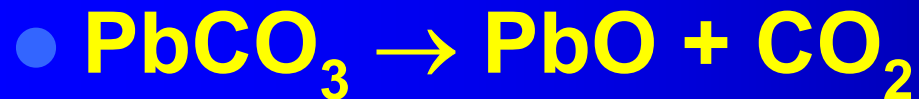
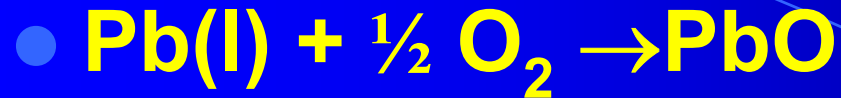


- $\text{Fe}_2\text{O}_3 + 3 \text{CO} \rightarrow 2 \text{Fe} + 3 \text{CO}_2$
- $\text{Pd}^{2+} + \text{CO} + \text{H}_2\text{O} \rightarrow \text{Pd} + \text{CO}_2 + 2 \text{H}^+$
- $\text{CO} + 2 \text{H}_2 \rightarrow \text{CH}_3\text{OH}$
- **Vodeni plin**
 - $\text{Ni} + 4 \text{CO} \rightarrow \text{Ni}(\text{CO})_4$
 - $\text{Cl}_2 + \text{CO} \rightarrow \text{COCl}_2$

•
Fosgen

- **Sn i Pb**

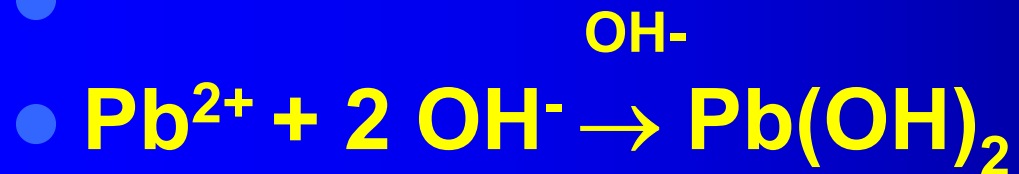




teško

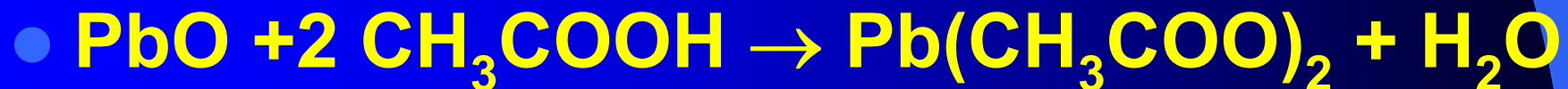
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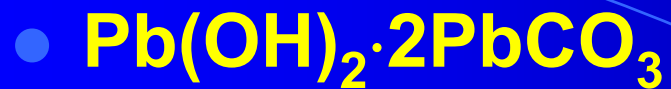
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-

H^+

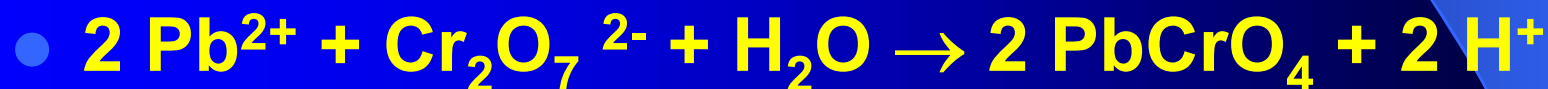
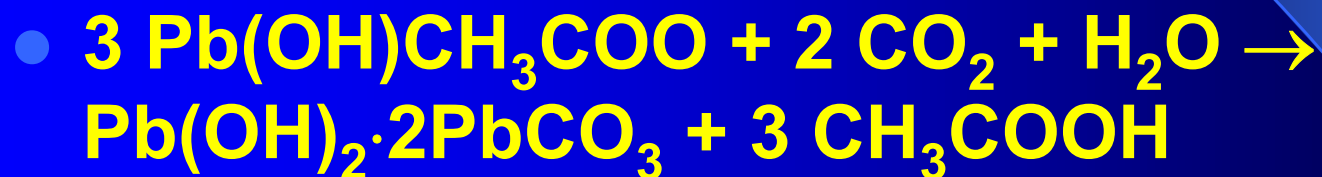




Olovno bijelilo

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H^+



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žut



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crven