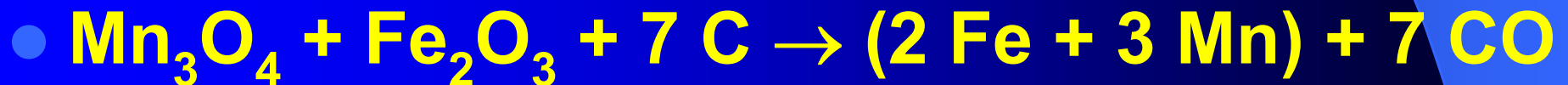


• 7. SKUPINA

- **Mn** **Tc** **Re** **Bd**
- $n s^2 (n-1) d^5$ (bohrij)

• Mangan

- MnO_2 piroluzit
- Mn_3O_4 hasmanit



-

• **w (Mn)**

• **80%**

feromangan

• **65 - 70 %**

silikomangan (15-20 % Si)

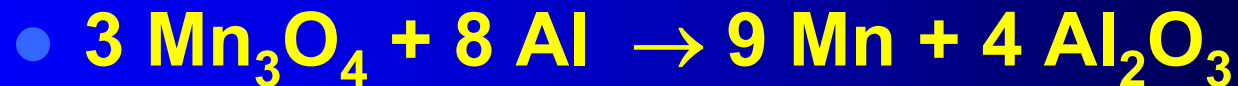
• **5 - 20 %**

zrcalno železo

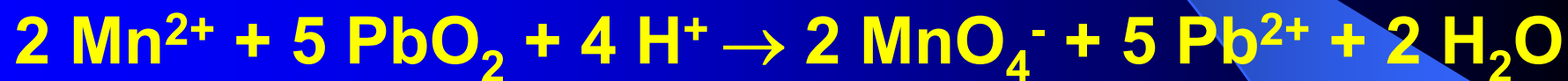
• **Legure:manganski čelik: w (Mn) = 13%,w(C)=1.25%**

nemagnetičan

• **Manganin: w (Cu) = 84 %, w(Mn) =12 %,w(Ni) = 4 %**



- II



2+

+4

+4



- IV

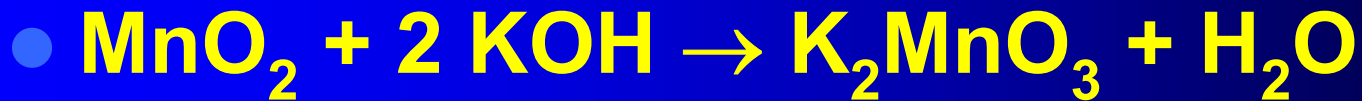


- +4

- +2

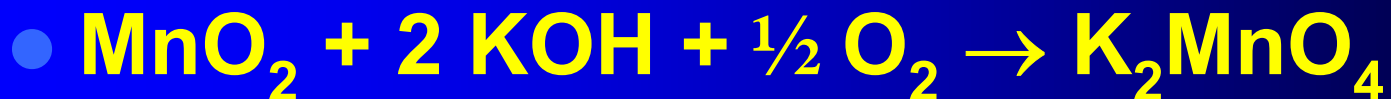


- VI

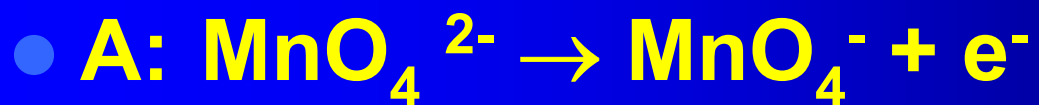


- +4

- +6



- VII



	8	9	10	
	Fe	Co	Ni	trijada željeza
	Ru	Rh	Pd	Laki
	Os	Ir	Pt	teški
	Hs	Mt	¹¹⁰ Uun	

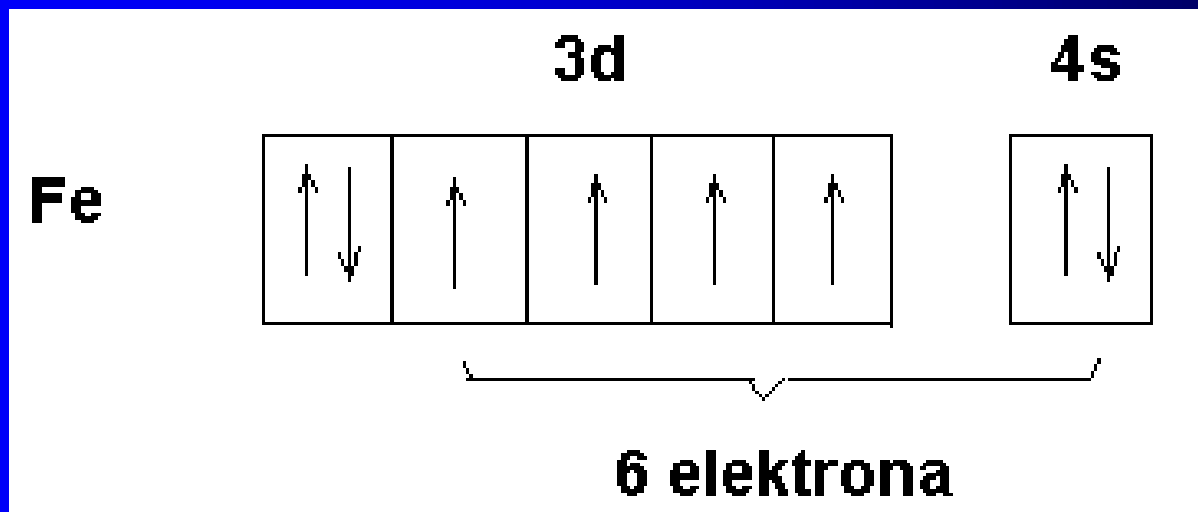
} platinski elementi

Hs - hassij

Mt - meitnerij

• TRIJADA ŽELJEZA

- Fe Co Ni
- VI V IV max.moguć oks. broj
- $4s^2 3d^6$ $3d^7$ $3d^8$



Fe,
II

Co
III

Ni
II

Najvažniji Spojevi

- Željezo:

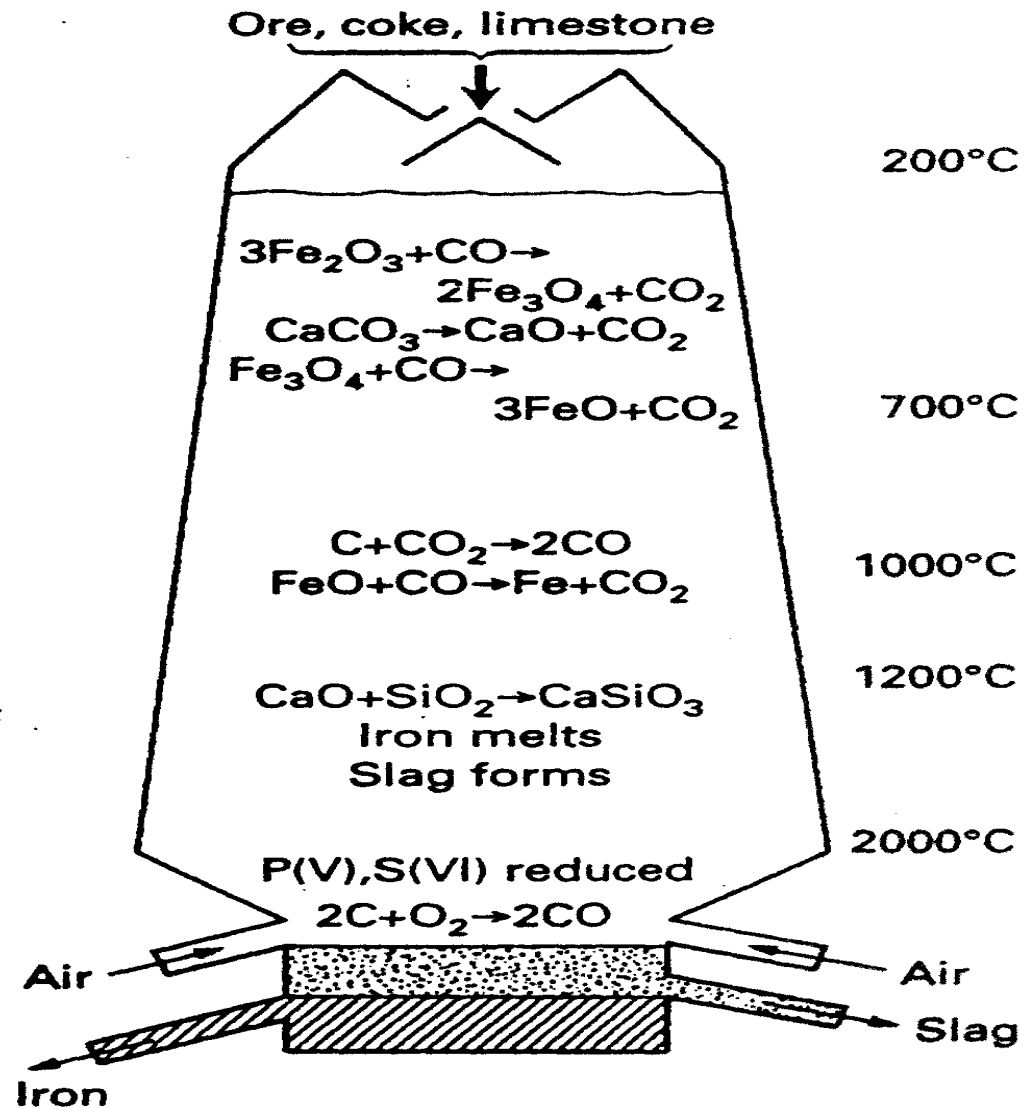
- | | |
|-------------------------|----------|
| Fe_2O_3 | hematit |
| Fe_3O_4 | magnetit |
| FeCO_3 | siderit |
| FeOOH | limonit |

- **Dob:**



- **Troska**

- Sirovo željezo do 4.5 % C
- Čelik < 1.7 % C
- Thomasov postupak $\text{Ca}_3(\text{PO}_4)_2$
- Bessemerov postupak
- $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$
- $\text{Si} + \text{O}_2 \rightarrow \text{SiO}_2$
- $\text{Mn} + \frac{1}{2} \text{O}_2 \rightarrow \text{MnO}$
- $2 \text{P} + \frac{1}{2} \text{O}_2 \rightarrow \text{P}_2\text{O}_5$
- $\text{SiO}_2 + \text{CaO} \rightarrow \text{CaSiO}_3$
- $\text{MnO} + \text{SiO}_2 \rightarrow \text{MnSiO}_3$
- $\text{P}_2\text{O}_5 + 3 \text{CaO} \rightarrow \text{Ca}_3(\text{PO}_4)_2$
- troska
- DEZOKSIDACIJA: $\text{FeO} + \text{Mn} \rightarrow \text{Fe} + \text{MnO}$



6.4 A schematic diagram of a blast furnace showing the typical composition and temperature profile.

- KOROZIJA Fe



- Spojevi

II

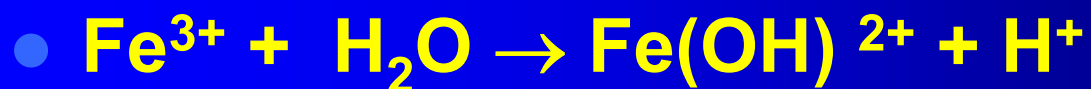
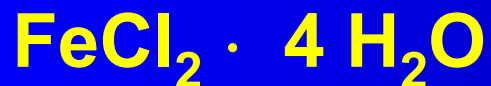


III



- pretežno ionski

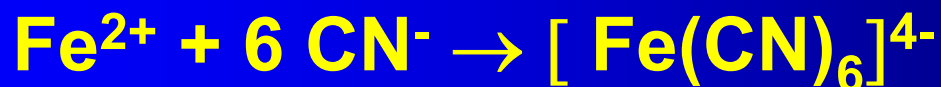
- kovalentni karakter



- Kompleksni spojevi



-



-

II

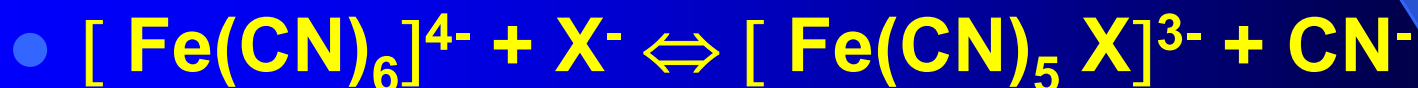
III

II



-

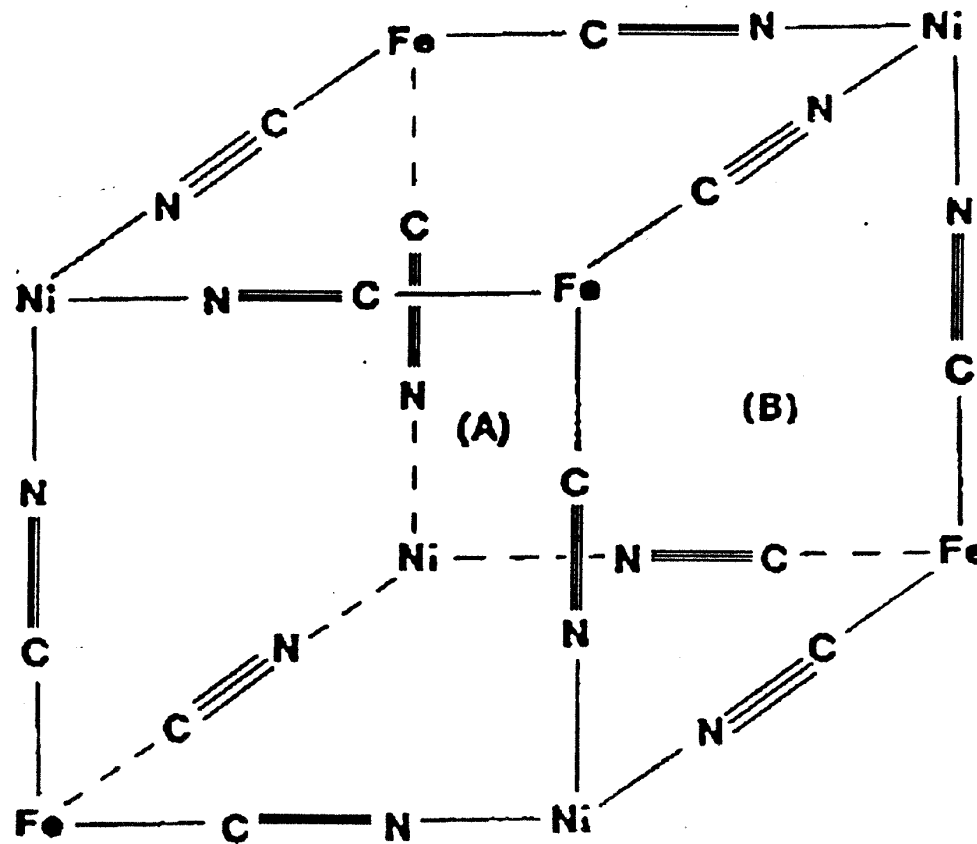
berlinat ion



-

prusiati





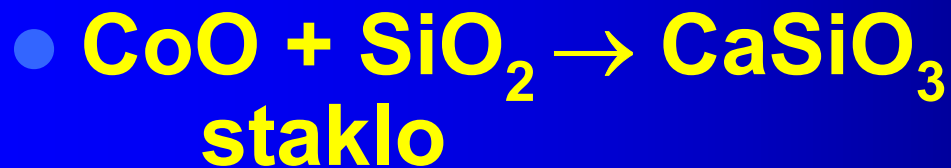
Slika 1. Kristalna rešetka niklovogheksacianoferata

- Kobalt

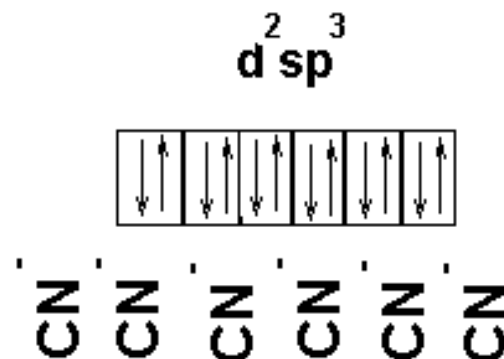
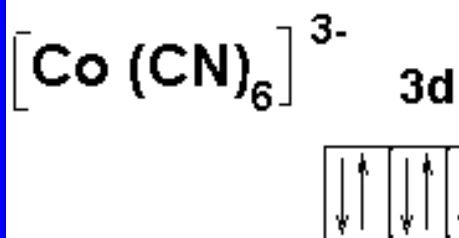
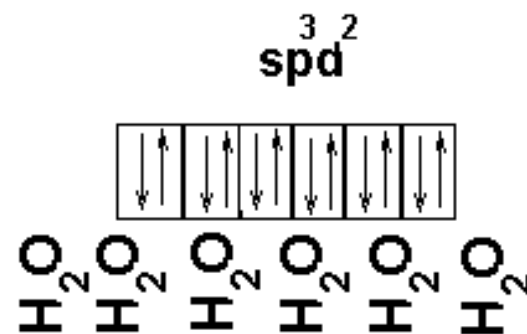
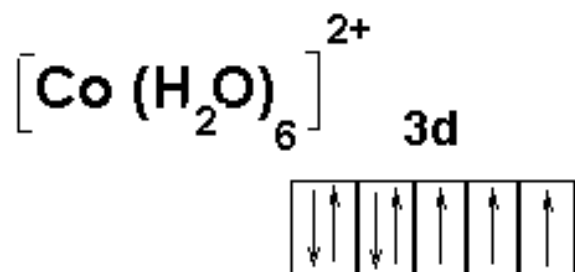


- Dobivanje uz Cu

- Spojevi: II III



- Thénardovo modrilo



Nikal



oksid



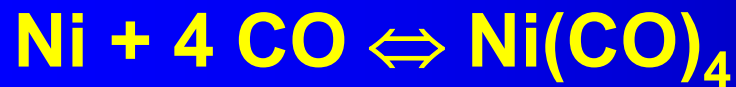
prženje



400°C



80° C



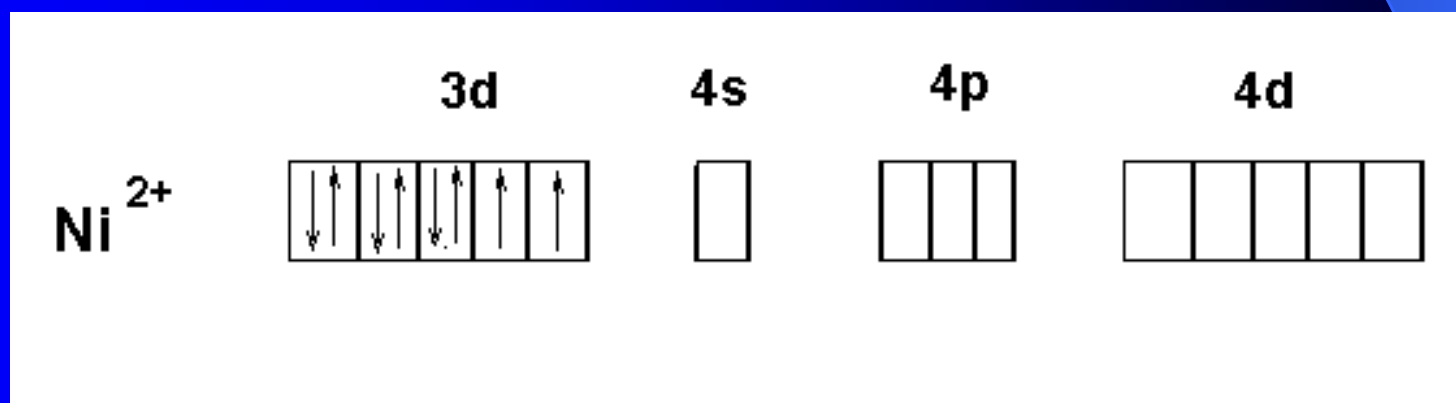
180°

Mondov postupak

- **Spojevi :** II III
- **Edisonov akumulator**
- **+ $2 \text{NiOOH} + 2 \text{e}^- + 2 \text{H}_2\text{O} \Leftrightarrow 2 \text{Ni(OH)}_2 + 2 \text{OH}^-$**
- **- $\text{Fe} + 2 \text{OH}^- \Leftrightarrow \text{Fe(OH)}_2 + 2 \text{e}^-$**
- **■ → pražnjenje**

- Kompleksni spojevi nikla (II)

- oktaedarski sp^3d^2 [Ni(H₂O)₆]²⁺
- $[Ni(NH_3)_6]^{2+}$
- tetraedarski sp^3 [Ni(Cl)₄]²⁻
- kvadratni dsp^2 [Ni(CN)₄]²⁻
- Ni²⁺ + 2 CN⁻ ⇌ Ni(CN)₂
- Ni(CN)₂ + 2 CN⁻ ⇌ [Ni(CN)₄]²⁻



- Platinski metali

- Ru Rh Pd

- $4d^7 5s^1$ $4d^8 5s^1$ $4d^{10}$

- Os Ir Pt

- $5d^6 4s^2$ $5d^7 6s^2$ $5d^9 6s^1$

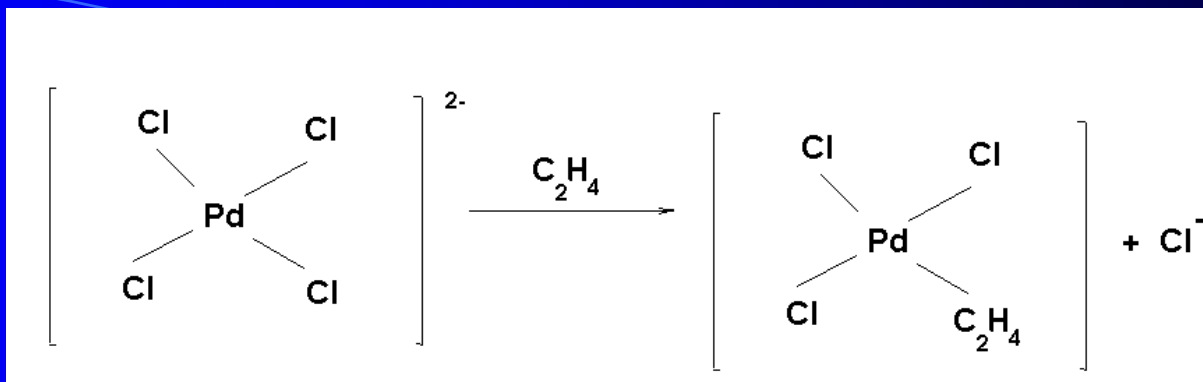
- Dob:



- $\text{AuCl}_4^- + 3 \text{ Fe}^{2+} \rightleftharpoons \text{Au} + 3 \text{ Fe}^{3+} + 4 \text{ Cl}^-$

- $\text{PdCl}_6^{2-} + 2 \text{ Fe}^{2+} \rightleftharpoons \text{PdCl}_4^{2-} + 2 \text{ Fe}^{3+} + 2 \text{ Cl}^-$

- $\text{PtCl}_6^{2-} + 2 \text{NH}_4^+ \rightarrow (\text{NH}_4)_2 [\text{PtCl}_6]$
- $(\text{NH}_4)_2 [\text{PtCl}_6] \rightarrow \text{Pt} + 2 \text{NH}_3 + 2 \text{HCl} + 2 \text{Cl}_2$
- Legure Pt s : B, Si, Pb, P, As, Sb, Bi
- $\text{PdH}_{0.5}$
- Pd (II)
 - $\text{Pd} + \text{Cl}_2 \rightarrow \text{PdCl}_2$
 - $2 \text{Pd} + \text{O}_2 \rightarrow 2 \text{PdO}$
 - $\text{PdCl}_2 + 2 \text{Cl}^- \rightarrow \text{PdCl}_4^{2-}$



- Wackerov process



-
-
- χ
- $E^0(M^+/M)/V$
- $E_{i||}/eV$

	Cu	Ag	Au	IIIUuu
		(n-1) d ¹⁰ n s ¹		
χ	1.9	1,9	2.4	
$E^0(M^+/M)/V$	+ 0.52	+ 0.8	+ 1.69	
$E_{i }/eV$	20.3	21.5	20.5	

- $Cu^+ + e^- \rightarrow Cu$ $E^0 = 0.52 V$
- $Cu^{2+} + 2 e^- \rightarrow Cu$ $E^0 = 0.34V$
- $Au^+ + e^- \rightarrow Au$ $E^0 = 1.69 V$
- $Au^{3+} + 3 e^- \rightarrow Au$ $E^0 = 1.5 V$

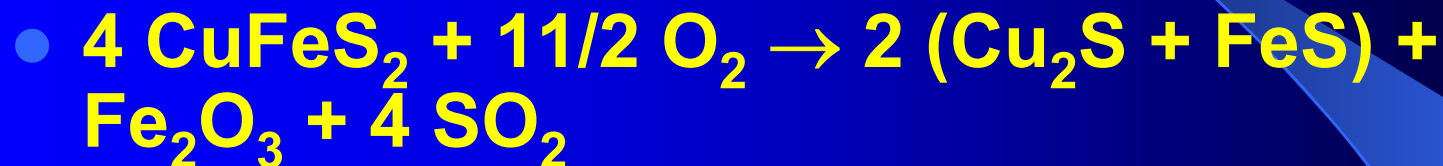
- $2 \text{Cu}^+ \Leftrightarrow \text{Cu}^{2+} + \text{Cu}$
- $3 \text{Au}^+ \Leftrightarrow \text{Au (III)} + 2 \text{Au}$
- **kompleksi**
- $\text{Cu}^{2+} + \text{e}^- \Leftrightarrow \text{Cu}^+ \quad E^0 = 0.16 \text{ V}$
-

- Dob: Cu

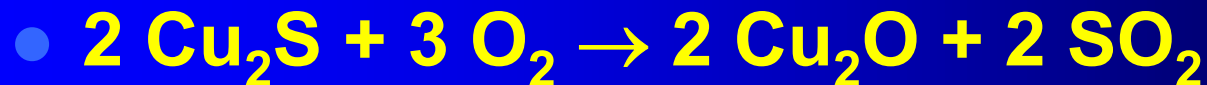
- CuFeS_2 halkopirit

- Cu_2S halkozin

- CuS kovelin

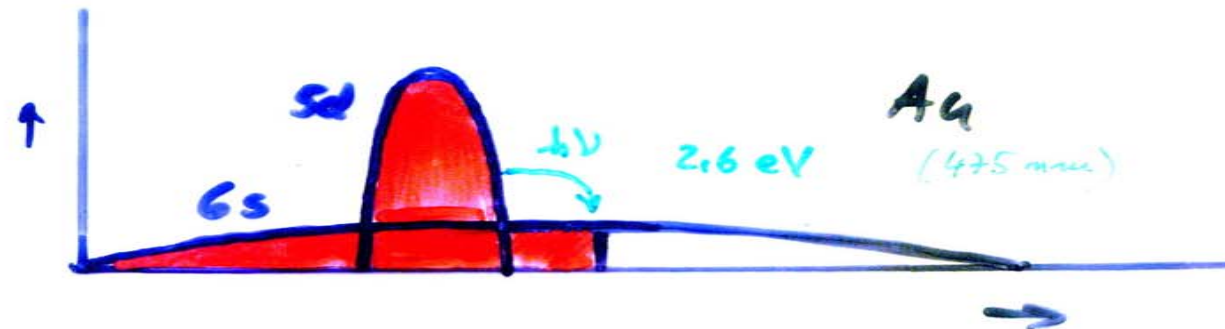
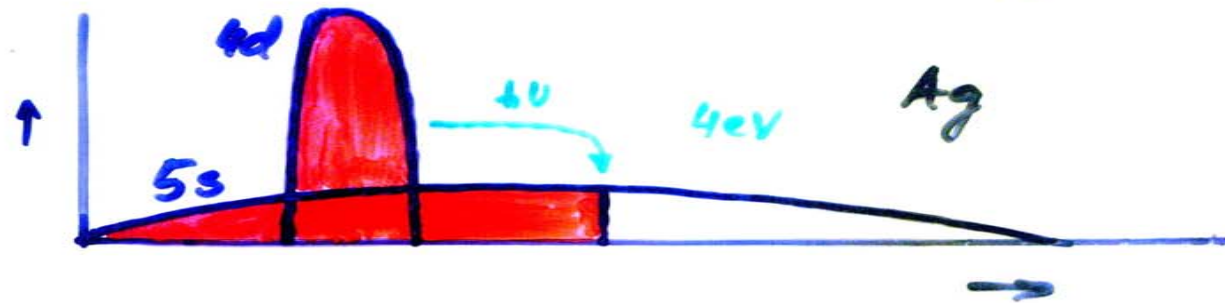
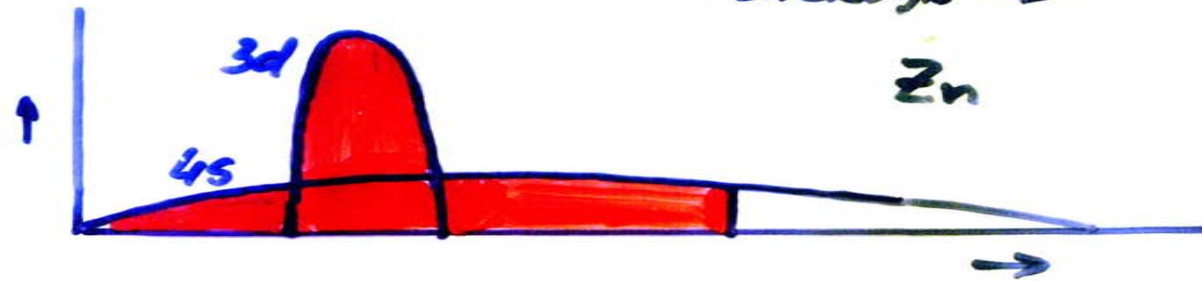
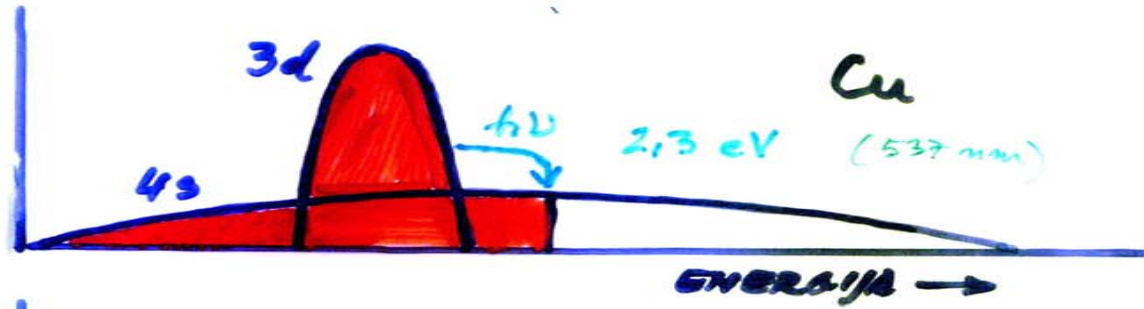


- \updownarrow bakreni kamen

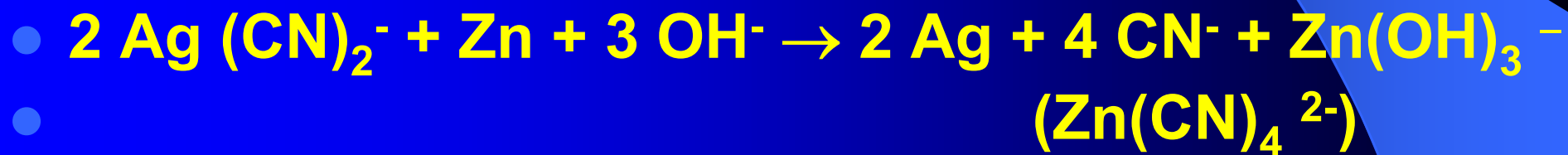
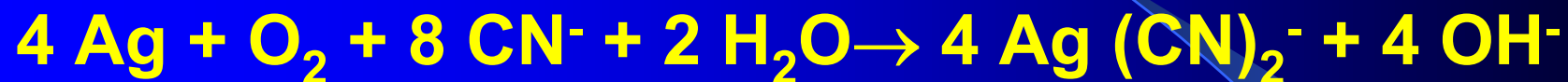


BOJA Cu, Ag, Au

Gustoća
energetskih
nivoa ↑



- Ag



- Au kao i Ag

-

- **Spojevi**

- **Cu**

- **Stabilni u vodenim otopinama**

- **Cu₂O , CuCl**

- **CuCN** **Cu²⁺ + 2 CN⁻ → CuCN (s) + 1/2 (CN)₂**

- **CuCN + 3 CN⁻ → Cu(CN)₄³⁻**

- **neobično stabilan**

- **kompleks**

- **[Cu (H₂O)₆]²⁺**

- **CuSO₄ · 5 H₂O**

- **Cu + 3 H⁺ + HSO₄⁻ + 1/2 O₂ → Cu²⁺ + SO₄²⁻ + H₂O**

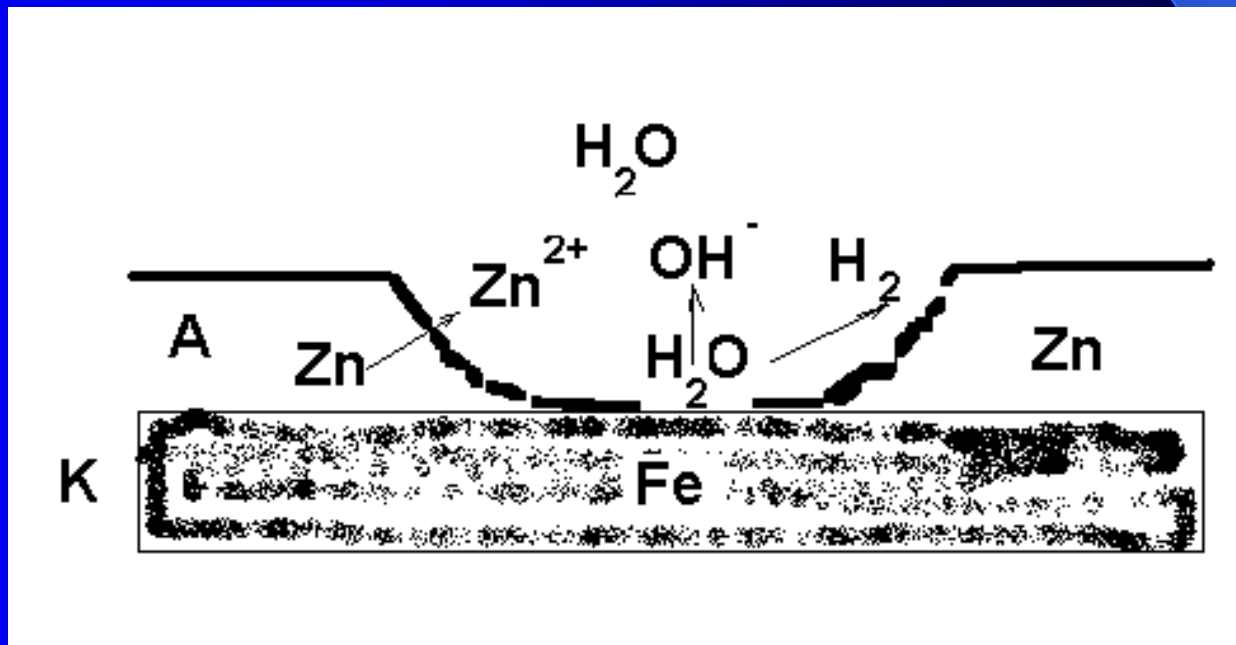
- Ag
- $\text{Ag Hal} \rightarrow \text{Ag} + \text{Hal}$
- $\text{Ag}^+ + 2 \text{CN}^- \rightarrow \text{Ag} (\text{CN})_2^-$
- $k \approx 10^{20} \text{ dm}^6 \text{ mol}^{-2}$
- AgNO_3
-

-
-
- χ
- $E^0 (M^{2+}/M) / V - 0.76$
- $E_i (I+II) / eV$

	Zn	Cd	Hg	¹¹³ Uub
	(n-1) d ¹⁰ n s			
χ	1.6	1.7	1.9	
$E^0 (M^{2+}/M) / V - 0.76$		- 0.4	+ 0.854	
$E_i (I+II) / eV$	27.3	25.8	29.1	

- **Dob: Zn**
- **ZnS sfalerit**
- **ZnCO₃ smitsonit**
- **$2 \text{ZnS} + 3 \text{O}_2 \rightarrow 2 \text{ZnO} + 2 \text{SO}_2 \text{ (g)}$**
- **$\text{ZnO} + \text{C} \rightarrow \text{Zn(g)} + \text{CO (g)}$**
- **Elektrolitski**
- **$\text{ZnO} + \text{H}^+ + \text{HSO}_4^- \rightarrow \text{Zn}^{2+} + \text{SO}_4^{2-} + \text{H}_2\text{O}$**

- $E^0 (\text{Zn}^{2+} / \text{Zn}) = - 0.76 \text{ V}$
- $E^0 (\text{Fe}^{2+} / \text{Fe}) = - 0.44 \text{ V}$
- $E^0 (\text{Sn}^{2+} / \text{Sn}) = - 0.14 \text{ V}$
- **K:** $\text{Zn}^{2+} + 2 \text{e}^- \rightarrow \text{Zn}$
- **A:** $\text{H}_2\text{O} \rightarrow \frac{1}{2} \text{O}_2 + 2 \text{H}^+ + 2 \text{e}^-$
- **Upotreba: Zaštita od korozije (Fe)**



- Cink i spojevi vrlo otrovni
- Cd dobivanje uz Zn
- Cd i spojevi vrlo otrovni (CdO) (g)
-
- Hg HgS cinobarit 0.1
mg/ m³ dozvoljeno
 - $\text{HgS} + \text{O}_2 \rightarrow \text{Hg(g)} + \text{SO}_2 \text{ (g)}$
- Živine pare i topljivi spojevi vrlo otrovni

- SPOJEVI



- Svojstva : amfoteran

- Upotreba: pigment , punilo



- zubarstvo

- ZnS



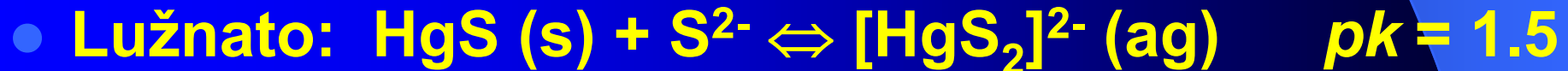
- CdO bazičan karakter

- CdS kadmijevo žutilo





- **Kiselo**



-

The image features a blue gradient background that transitions from a lighter blue on the left to a darker blue on the right. A curved line starts at the top left and curves towards the bottom right, creating a wedge-shaped area of lighter blue on the right side. The text "THE END" is centered in the middle of the image in a bold, yellow, sans-serif font with a slight shadow effect.

THE END