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# Research into Possibly of Intensification of Segregation Roasting of Laterite Nickel Ores at Localities from Cikatovo and Rudjinci Subject to Nickel Concentration

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## **Abstract:**

*A combination of current trends and developments may undermine the sulphides supremacy and might tip the balance in favour of laterites for new investigations or projects. A list of current laterite operations or laterites processing today is well known. Besides pyro metallurgical and hydrometallurgical treatment there were new ones as alternative into possibilities of intensification of segregation roasting of Laterite Nickel Ores at different Localities*

## **1. Introduction**

The same is the interest and perspective of the segregation process. The previous investigations in the field of the metal compounds chlorination, especially the chlorination of the refractory nickel minerals: garnierite and nontronite, by the chlorine, HCl or NaCl or CaCl<sub>2</sub>, were determined directions, confirming the perspective of the mentioned process for the treatment of the low grade and complex minerals-laterites. The principal scheme of the segregation process following by the classical concentration methods - flotation or magnetic separation and hydrometallurgical treatment - ammonia leaching. The combined methods for enriching of the oxide-silicate nickel ores are these through which by heating the ore with coke and CaCl<sub>2</sub> at high temperature metal nickel is formed on the present coke, or on the silicates which are the component parts of the ore. There are the following steps, as it's shown on the scheme: the formation of the HCl and H<sub>2</sub>; the chlorination of the Ni-ferite and Ni-silicates to Ni-chlorides, Fe-chlorides and the reaction of reduction to Ni-metal on the coke parts or quartz parts. The next steps are flotation, magnetic separation or ammonia leaching of the formed Ni-metal.

## **2. The experimental investigations from the nickel natural ores by segregation process**

The experimental investigations by the addition-activator 2% (BaS,FeS,S or BaSO<sub>4</sub>) influence on the metallurgical indicators from combined processes **segregation-flotation-magnetic separation-ammonia leaching** are shown about the ore samples from various deposits.

Table 2. Results from segregation-flotation–mag. separation-NH<sub>4</sub>OH leaching (100% - 0.074 mm)

Ore sample	BaS (%)	Recovery (%), R <sub>Ni</sub>		
		Flotation	Mag. separat.	Leaching
<b>Cikatovo I</b>	0.0	46.50	44.70	47.20
	2.0	55.45	52.85	56.10
	3.5	60.70	55.60	62.35
<b>Cikatovo II</b>	0.0	46.85	45.30	47.60
	2.0	57.10	56.60	58.20
	3.5	62.30	60.70	65.10
<b>Rudinci I</b>	0.0	52.50	50.25	63.10
	2.0	68.60	65.30	70.20
	3.5	75.00	73.20	76.75
<b>Rudinci II</b>	0.0	66.00	61.75	67.05
	2.0	78.00	75.30	70.20
	3.5	82.00	83.60	80.30

The principal scheme of the segregation process following by the classical concentration methods - flotation or magnetic separation and hydrometallurgical treatment - ammonia leaching. The combined methods for enriching of the oxide-silicate nickel ores are these through which by heating the ore with coke and CaCl<sub>2</sub> at high temperature metal nickel is formed on the present coke, or on the silicates which are the component parts of the ore.

Table 3. Results from segregation-flotation-mag. separation-NH<sub>4</sub>OH leaching (100% - 0.074 mm)

Ore sample	Addition (%)	Recovery (%) R <sub>Ni</sub>		
		Flotation	Mag. separat.	Leaching
<b>Cikatovo I</b>	2.0% FeS	47.00	44.35	48.35
	3.5% FeS	60.70	56.70	62.75
	2.0% BaS	47.05	44.35	50.10
	3.5% BaS	61.10	57.00	63.25
	2.0% BaSO <sub>4</sub>	45.20	42.30	47.05
	3.5% BaSO <sub>4</sub>	60.10	56.00	64.10

<b>Cikatovo II</b>	2.0% FeS	49.50	47.20	52.30
	3.5% FeS	61.50	56.35	63.50
	2.0% BaS	50.25	48.10	53.10
	3.5% BaS	60.10	56.00	64.10
	2.0% BaSO <sub>4</sub>	49.80	48.00	51.40
	3.5% BaSO <sub>4</sub>	60.50	56.10	64.00
<b>Rudinci II</b>	2.0% FeS	79.60	76.30	81.85
	3.5% FeS	80.50	79.10	83.10
	2.0 % BaS	82.40	78.25	85.00
	3.5% BaS	76.50	73.45	80.00
	2.0% BaSO <sub>4</sub>	70.30	65.30	74.00
	3.5% BaSO <sub>4</sub>	76.50	73.45	78.00

### 3. Conclusion

The combined processes **segregation-flotation-magnetic separation-ammonia leaching** by the synthetic mixures and appropriate ore samples ( various nickel content) have achieved satisfactory results related on the metal recoveries. The existing environmental problems will lead to increased interest in combined processes or hydrometallurgical processes. These include combined processes: **segregation-flotation-ammonia leaching**.

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