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# THE GOLD RECOVERY CLEAN TECHNOLOGY FROM REFRACTORY GOLD ORES USING MICROWAVES' ENERGY

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## *Introduction*

Gold recovery from refractory ores has always been a challenge for the scientific community. Low powers' and reagents' consumptions beside the ecological impact's limitation represent the main goals of any highly effective technology. Microwaves' energy is the right answer of those problems.

The present paper aims to present the main research results obtained at the refractory gold-bearing pyrites' microwaving and processing.

The microwaves use's advantages have been pointed out by comparative cyanidation tests carried on microwaved and non-microwaved gold-bearing pyrites samples.

## *Materials and methods*

INTEC SA in partnership with INCDMRR has accomplished an experimental setup to process the gold bearing pyrite with microwaves in fluidized bed in order to increase the precious metals' extraction efficiency, to decrease reagents' consumption and to save energy.

The experimental setup consists in:

- the microwave generator,
- the waveguide type transmission line,
- the microwave applicator, which is a processing reactor in fluidized bed,
- the fluidizing reagent's supply tank,
- gas-powder separator, which is a cyclone,
- reaction products' neutralizing reactor.

All reagents were analytically grade. Sodium cyanide was used as lixiviation reagent and the lime neutralizing one.

The pyrite was roasted using microwaves at 400$^{o}$C and 700$^{o}$C in order to point out the roasting temperature's effect on gold extraction efficiency and reagents' consumption.

The cyanidation was performed using "rolling bottle" method.

***Results and conclusions***

The research results pointed out that when the pyrite was microwaved at 400$^{o}$C there was not any significant decrease in the lime and cyanide consumption in comparison to the non-microwaved ones. When the pyrite has been microwaved at 700$^{o}$C lime's consumption has decreased from 110kg/t to 10 kg/t, and the cyanide's one from 2.8 kg/t to 1.76 kg/t, respectively.

The gold's lixiviation yields have increased from 50% in case of non-microwaved pyrite up to 81% when the pyrite was microwaved at 700$^{o}$C.

The sulphur content has decreased from 42.3% of the non-microwaved pyrite to 25% in case of pyrite microwaved at 400$^{o}$C and to 15% for the one at 700$^{o}$C.

Sulphur's content diminution to 3% in order to allow the wet chlorination and to eliminate cyanide's use lixiviation reagent besides the avoidance of slag's production into the resonant cavity should be considered as future research goals.