

SODERN CNA-NICKEL

Real-time quality control for the nickel ore mining industry

The Sodern CNA-Nickel is the fourth generation of the world's most advanced online elemental analyzer, based on the PFTNA (Pulsed Fast and Thermal Neutron Activation) technology. Nickel mining and extraction operations will benefit from control of quality and moisture of the ore before shipping to and arrival at the treatment plant, enabling sorting of material on nickel content and optimizing the homogenization of the stockpile.

When integrated into the pyrometallurgical extraction process, the Sodern CNA-Nickel is an essential tool to control the nickel grade (the Fe/Ni ratio) and the basicity index (MgO/SiO_2) of the material entering the kiln. As such, extraction process requires removal of all free moisture and combined water. Controlling the moisture also allows for significant energy savings. Similarly, online elemental analysis can also be beneficial for the hydrometallurgical process, which in turn is seen to be the future for the treatment of lower grade nickel laterite.



Advantages of Sodern CNA-Nickel

Unique and proven PFTNA technology – for the management of nickel ore mining and extraction operations and control and optimization of the concentration process

Unmatched nickel grade measurement – thanks to the low signal to noise ratio and the high metallic element detection capability

Uptime

- Unmatched analytical stability delivered by constant neutron flux from generator eliminates expensive and inconvenient periodic on-site calibration
- Modular design minimizes downtime during installation

Ultimate safety – Unlike radioactive isotope-based units which always emit neutrons, the Sodern CNA's tube type neutron source can be switched off during non-operation, routine maintenance or emergency and enables installation of a unique Automated Radiation Protection System (ARPS).

Global support and expertise



SODERN CNA-NICKEL

Addressing the needs of the nickel ore mining and concentration operations

Benefits of a cross-belt analyzer in your process

Mining

Installation of a Sodern CNA in the mining operation (before and/or after shipment to the treatment plant) enables control of the nickel grade and moisture which allows for sorting and optimizing the stockpile and shipment, delivering value to both sender and receiver.

Extraction

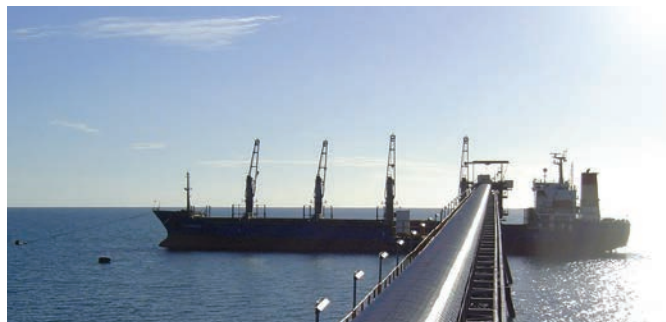
A Sodern CNA installed after dryer operation enables control of the nickel grade, the Fe/Ni ratio and the basicity index (MgO/SiO_2) of the material entering calciners. It is possible to adjust silica, iron or carbon additives to prevent corrosion of the furnace lining. By determining the moisture content, the Sodern CNA-Nickel allows for optimization of the dryer parameters in the pyrometallurgical process resulting in significant energy savings during the calcine process.

Nickel, from sulfide nickel ores, is extracted by a process where the nickel sulfide mineral is freed from gangue by crushing and grinding, after which it is separated by flotation and finally smelted or roasted. Extraction of nickel from the laterite ores is carried out either by pyrometallurgical (for saprolite) or hydrometallurgical (for limonite) process.

PANalytical and Sodern have extensive experience in the analysis of lateritic nickel ores in New Caledonia and more precisely of silicate (or saprolite) type of lateritic nickel ores. However, the Sodern CNA-Nickel can be used for sulfide nickel ores as well.

Cost-saving opportunities

- Value optimization at nickel ore mining operation
- Energy savings by moisture control
- Prevention of corrosion damage to the kiln
- Manpower and maintenance savings by removal of the sampling tower



Unique and proven PFTNA principle

Using high energy neutrons to determine the chemistry of materials is very useful for process control because the analysis is done instantaneously, allowing many control changes over short periods of time to achieve the target chemistry. The analysis is very representative since all the material on a belt from top-to-bottom and side-to-side is being analyzed.

Pulsed Fast Thermal Neutron Activation (PFTNA) analysis involves 'illuminating' the raw material with neutrons. By measuring the energy of each gamma ray induced by the interaction of neutron and nucleus of atoms, most elements contained in the raw material (such as silica, calcium, alumina and iron) are identified and quantified.

The primary analytical advantage of PFTNA over traditional Prompt Gamma



Neutron Activation Analysis (PGNAA) is the ability to pulse the neutrons used to excite the sample. Pulsed excitation produces a much higher quality time-resolved gamma ray spectrum from the sample with a drastically improved signal to noise ratio. This higher quality data results in a more accurate and robust analysis.

Uptime

Stability

The Sodern CNA's comprehensive factory calibration is guaranteed to be drift-free. The rate of neutron generation is fully controlled and never changes over the lifetime of the tube, thus the same level of analytical performance is maintained. This stability eliminates the need for the laborious and expensive routine recalibrations that are required with radioactive isotope-based systems.

Modular design

The Sodern CNA's modular design makes it easy to install and service, guaranteeing that downtime is kept to an absolute minimum.

Safety

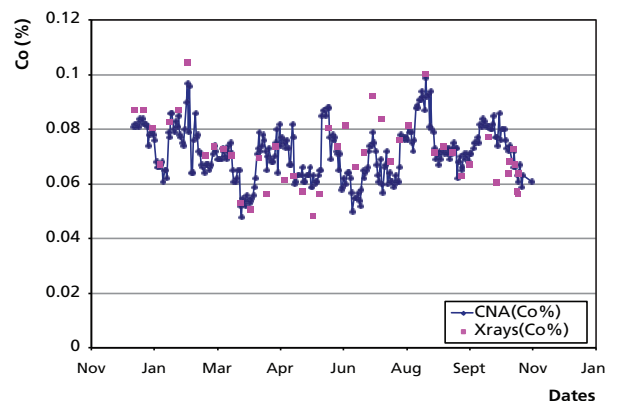
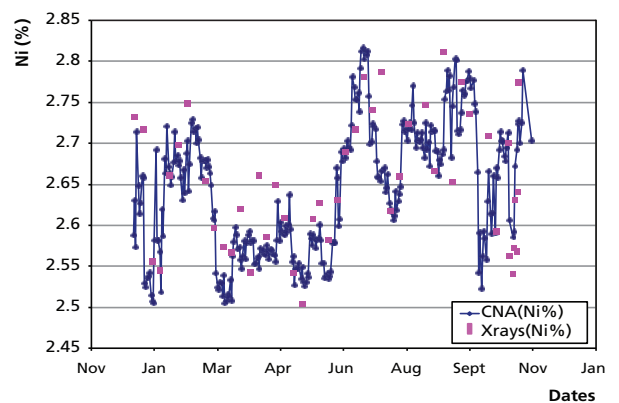


In addition, the electric neutron source does not present the kind of hazardous waste issues that are unavoidable with radioactive isotope-based analyzers.

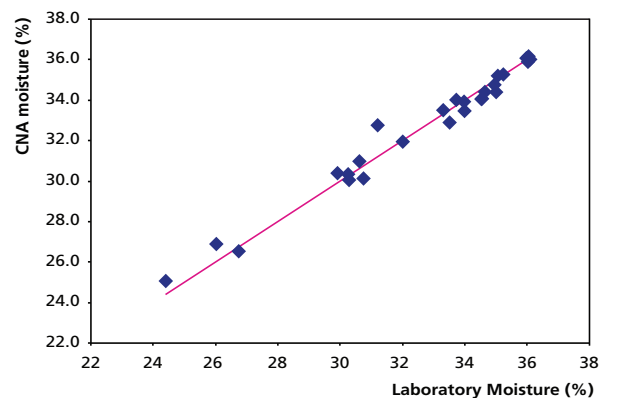
The lifetime of this source can exceed 14,000 working hours, making it the longest lifetime tube of any commercially available neutron tube. The Sodern sealed neutron tube has evolved from 40 years of experience in designing and manufacturing neutron generation products. Only Sodern EADS is the world's leading supplier of neutron tubes for a vast assortment of industrial, defense and security applications worldwide.

Improving safety by using an electrical source is a major benefit of PANalytical's analyzers. As a small particle accelerator made by Sodern EADS, the pulsed neutron generator is an ON/OFF electric neutron source and the basis of PFTNA analysis.

Analytical results



Sodern CNA-Nickel real-time analytical data for Ni and Co compared to laboratory results from X-ray



Sodern CNA-Nickel moisture results compared to laboratory values show a very good correspondence.

Specifications

Analysis	
Methods	Pulsed fast & thermal neutron activation analysis
Generator	Electrical neutron generator (On/Off)
Quantified elements	For laterite ores: Ni, Co, Fe, Mg, Si, Al, Mn, Cr, C, H, O For sulfide ores: on request
Nickel parameters	For laterite ores: Ni, Co, Fe ₂ O ₃ , MgO, SiO ₂ , Al ₂ O ₃ , Mn, Cr ₂ O ₃ and CaO Nickel grade (the Fe/Ni ratio) and the basicity index (MgO/SiO ₂) and moisture For sulfide ores: on request
Features	Unaffected by varying belt loading
Environment	
Temperature	From -35°C (-31°F) to 40°C (105°F) (extended temperature range is optional)
Humidity	1-100%
Operational	
Conveyor width	800 to 1400 mm
Bed depth	100 to 280 mm
Belt speed	Up to 4 m/s, faster speed upon request
Belt inclination	Up to 20°
Particle size	Maximal 90 mm
Belt load	50 to 150 kg/m
Installation	
Standard version	W = 2 m, L = 1.1 m and H = 1.8 m Weight = about 2.9 T
Extended shielding	W = 2.2 m, L = 1.3 m and H = 2.1 m Weight = about 5.3 T
Electronics	
Electrical cabinet	H = 800 mm, W = 600 mm, D = 400 mm
Power requirement	Single phase 230 V, 47 to 63 Hz, less than 2 kW
Dry contact inputs	Belt status, safety loop
4 - 20 mA inputs	Weight feeder, speed feeder
User interface	
CNA control software	CNA data collector, trending application and basic pile building function
System interface	OPC (industry standard for communication) Other interfaces upon request
Communication	
Serial	Ethernet or fiber optic Suitable interface with many plant control networks
Off-site communication	Data quality phone link or internet link
Safety	
Safety loop	ARP System (Automatic Radiation Protections System)
Radiation levels	Compliant with European council directive 96/29/ EURATOM No radiation when the CNA is not in operation
Maintenance	
Customer support	PANalytical customer support service with PANassist. Wide range of maintenance contracts upon request

Other applications

PANalytical also offers PFTNA cross-belt based applications for raw material characterization, quarry/mine management, raw material sorting/blending, and stockpile pre-homogenization and modelization for:

- Iron ore
- Copper ore and concentrate
- Coal



Global support and expertise

A powerful built-in diagnostics program links the CNA to PANalytical customer support service. Thanks to a modem or an Internet connection, remote system diagnostics and maintenance are facilitated, ensuring optimum operation and uptime of the CNA. In addition, dedicated and reactive high-skilled engineers are internationally present, allowing assistance around the clock everyday.



Global and near

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