CVMR CORPORATION

MONTHLY NEWSLETTER

AUGUST 2012

Production and Consumption of Carbonyls of Various Metals Come of Age

Today, 20% of the world's production of nickel is produced via the carbonyl process. Over all 720,000 to 800,000 tonnes of nickel and iron carbonyl are produced annually, using modern technologies for refining of these metals. Though hazardous, there have been no reported incidents in the past 10 years associated with the production of these carbonyls.

CVMR has been producing carbonyls of various metals in the past 25 years in 18 different countries without a single incident. This is attributed to the procedures and technologies used by CVMR in the production of various carbonyls. The products from carbonyl refining have higher economic values and are safer to handle.

Nickel Carbonyl

Nickel carbonyl (IUPAC name: **tetracarbonylnickel**) is the organonickel compound with the chemical formula $Ni(CO)_4$. It is a pale-yellow liquid, which is used as an intermediate in the purification of nickel.

$Ni(CO)_4$ was first synthesised in 1890 by Ludwig Mond, by the direct reaction of nickel metal with CO. This pioneering work foreshadowed the existence of many other metal carbonyl compounds, including those of V, Cr, Mn, Fe, and Co. It was also applied industrially to the purification of nickel by the end of the 19th century.

Thermal decarbonylation

On moderate heating, $Ni(CO)_4$ decomposes to carbon monoxide and nickel metal. Combined with the easy formation from CO and even impure nickel, this decomposition is the basis for the Mond Process and the subsequent technologies developed at CVMR, for the purification of nickel.

$Ni(CO)_4$ is a toxic substance and should be handled with care. It is highly hazardous, much more so than implied by its CO content, reflecting the effects of the nickel if it were released in the body.

Iron Carbonyl

Iron pentacarbonyl, also known as **iron carbonyl**, is the compound with formula $Fe(CO)_5$. Under standard conditions $Fe(CO)_5$ is a free-flowing, straw-colored liquid with a pungent odour. This compound is a common precursor to diverse iron compounds, including many that are useful in organic synthesis. $Fe(CO)_5$ is prepared by the reaction of fine iron particles with carbon monoxide.

The industrial production of this compound is somewhat similar to the Mond Process in that the metal is treated with carbon monoxide to give a volatile gas. In the case of iron pentacarbonyl, the reaction is more sluggish. It is necessary to use iron sponge as the starting material, and harsher reaction conditions of 5-30 MPa of carbon monoxide and 150-200 °C. Similar to the Mond process, sulfur acts as a catalyst. The crude iron pentacarbonyl is purified by distillation. Most iron pentacarbonyl produced is decomposed on site to give pure carbonyl iron in analogy to carbonyl nickel. Some iron pentacarbonyl is burned to give pureiron oxide.

It was recently announced that:

"Carbonyl Iron Less Toxic and Better Tolerated than Ferrous Iron"

Slower to Absorb

With ferrous iron, generally all iron is available for absorption. However, with carbonyl iron, only a small percentage is available for absorption. The rate at which your body absorbs carbonyl iron depends on the production of gastric acid (which is required to make carbonyl iron soluble), and the balance between the iron being dissolved and absorbed by your intestines. This means that carbonyl iron enters your system much more gradually than other types of iron that can dissolve rapidly.

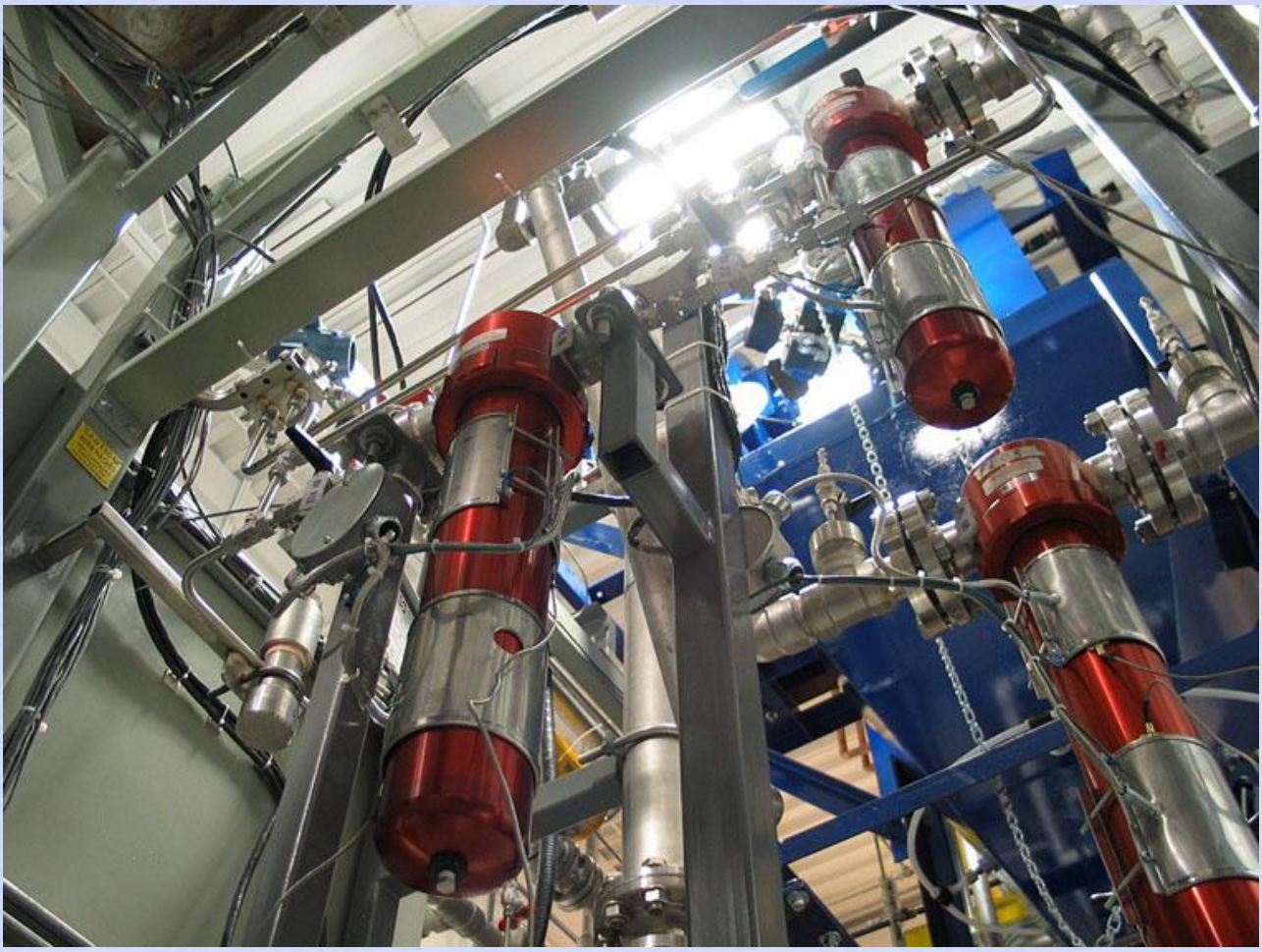
Less Toxic than Ferrous Iron

Researchers believe that this slow rate of solubilization minimizes the toxicity of carbonyl iron. In fact, studies have shown that carbonyl iron is far less toxic than other forms of iron, even at high doses. Patients taking carbonyl iron can tolerate 10 to 150 times the standard dose of ferrous sulfate iron, while still having nearly the same side effects.

Lower Incidence of Overdose

Lower toxicity can also help prevent iron overdose, a serious concern in households with children. Statistics from the American Association of Poison Control Centers show that when compared with ferrous iron, carbonyl iron is associated with a much lower incidence of accidental overdose or poisoning. In fact, one study found that between 1985 and 2002, 19 deaths were reported for children who ingested ferrous sulfate, while none were reported for carbonyl iron.

Ferralet® 90 is a prescription iron supplement approved for treating anemias that respond to oral iron therapy. Your doctor may prescribe Ferralet® 90 if you have certain anemias associated with pregnancy, blood loss, or metabolic disease, or if you are recovering from surgery or do not have enough iron in your diet." www.ferralet.com



CVMR® Filtration System

Introducing New Technologies Based on Long Established Chemical Processes

On August 13, 2012 CVMR® Corporation unveiled five new technologies in the line of its metal refining technologies, in Toronto, Canada. A number of engineering firms from the mining industry attended the exhibition and the demonstration of these new technologies. The exhibition was held at CVMR®‘s R&D Centre at 35 Kenhar Drive.

Of the five new technologies being exhibited, two were the result of new improvements on CVMR®‘s old carbonyl methods and three were based on completely new methodologies and technologies developed at CVMR®.

Introducing New Technologies Carbonylation Reactor at JJNI, China

Introducing New Technologies (Cont….)

CVMR® technologies are all unique in their field, all are developed in-house at CVMR® , they are all patented and ready for demonstration, piloting and large-scale refining.

CVMR® Carbonyl Process:

Nickel, Cobalt and Molybdenum are refined economically at CVMR® ,using CVMR® 's Carbonyl Technology (credit from other elements).

Depending on the feed material's composition the end product can contribute additional value, by refining Iron, Chromium and Tungsten.

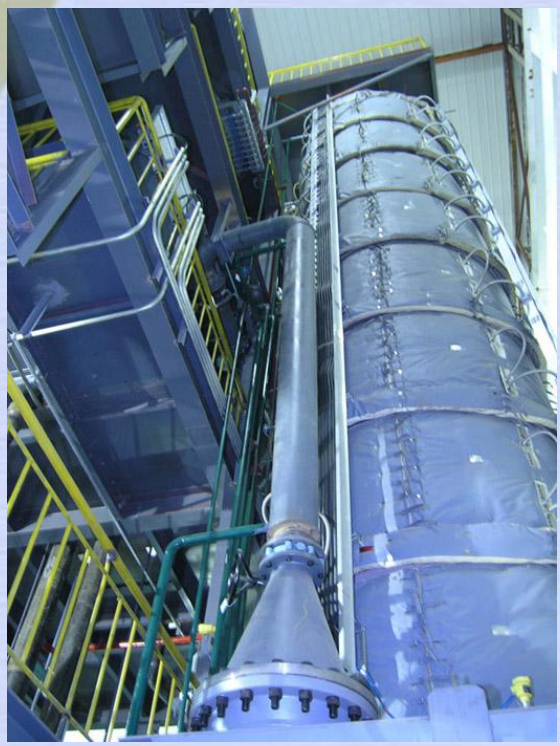
1. CVMR® Carbonyl technology is used to concentrate Platinum group metals, Gold and Rare Earth Elements (REE). Usually Platinum group of metals and Gold are washed out with Iron from light elemental fraction. Rare Earth Elements get separated during Carbonylation, and can be concentrated by magnetic/gravity separation.

2. CVMR® 's Iodide process:
At CVMR® , we refine Zirconium and Titanium to the purest level, using CVMR® 's Iodine process.

3. CVMR® 's Chlorination Process:
Niobium, Tantalum, Titanium, Zirconium and Rare Earth Element can be refined directly via CVMR® 's Chlorination process.

4. CVMR® 's Phosporous Tri Fluoride Process:
Platinum group metals can be refined using PF3 as process gas.

5. CVMR® 's Carbonyl-Chlorination Process:
This process refines Platinum Group metals using Carbonylation and Chorination-a combined process.



CVMR® Powder Decomposer

Past and Present

- CVMR® Corporation is the holding company for:
- Chemical Vapour Metal Refining Inc.
- CVD Manufacturing Inc.
- Chemical Vapour Deposition Systems Inc.
- PGM Refining Inc.
- CVD Systems Design and Installation Inc.
- 27 mining and metal refining companies in 18 countries.

The company was founded in 1986. It is engaged in mining, metal refining and development of a unique series of vapour metallurgy processes and technologies, including: CVMR® Carbonyl Technology, CVMR® Iodide Technology, CVMR® Chlorination Technology (Coltan refining) and CVMR Phosphorous Tri Fluoride Technology (PGE refining). It produces Nickel, Cobalt, Iron and other metals and alloys powders in various sizes and morphologies. CVMR®'s Nano-Metal-Powders are used extensively by various manufacturers in North America, Europe and the Far East.

CVMR® has extensive investments in fully-integrated mineral assets, worldwide. Its refining processes are unique to the Company, environmentally neutral and quite cost effective. These technologies are mostly developed in house, at CVMR®'s laboratories and pilot plants.

Over all the company has over 35,000 employees working in 18 countries. The Centre for Research and Development of CVMR® Corporation and its Head Office are in Toronto, Ontario, Canada. Over 150 scientist including, metallurgists and engineers, with expertise in related areas, work at the CVMR®'s R&D Centres around the world.

Past, Present & the Futures

Futures

GOLD

	LAST		CHANGE	% CHANGE
* GOLD	1604.30	▲	3.90	+0.24%

COMEX GOLD FUTURES

SILVER

	LAST		CHANGE	% CHANGE
* SILVER	27.78	▲	0.017	+0.06%

COMEX SILVER FUTURES

COPPER

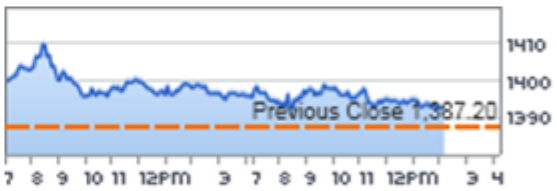
	LAST		CHANGE	% CHANGE
* COPPER	3.347	▼	-0.012	-0.36%

COMEX COPPER FUTURES

PLATINUM

	LAST		CHANGE	% CHANGE
* PLATINUM	1393.40	▼	-5.70	-0.41%

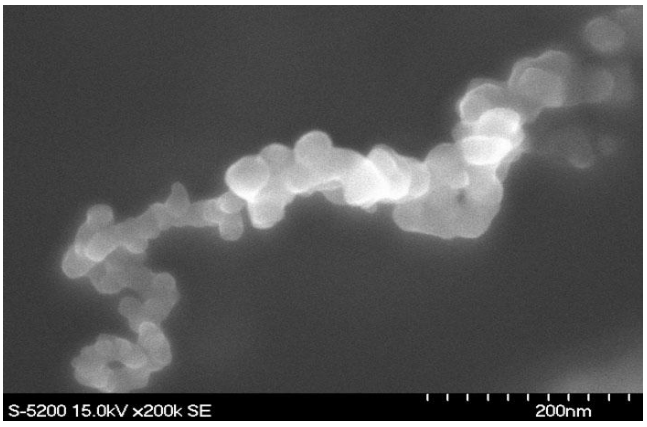
COMEX PLATINUM FUTURES



PALLADIUM

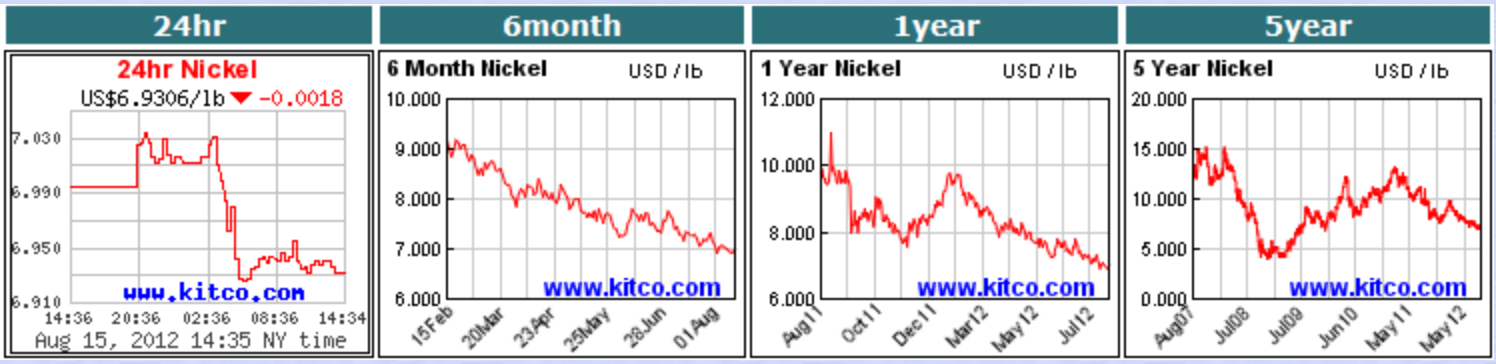
	LAST		CHANGE	% CHANGE
* PALLADIUM	574.05	▼	-4.35	-0.75%

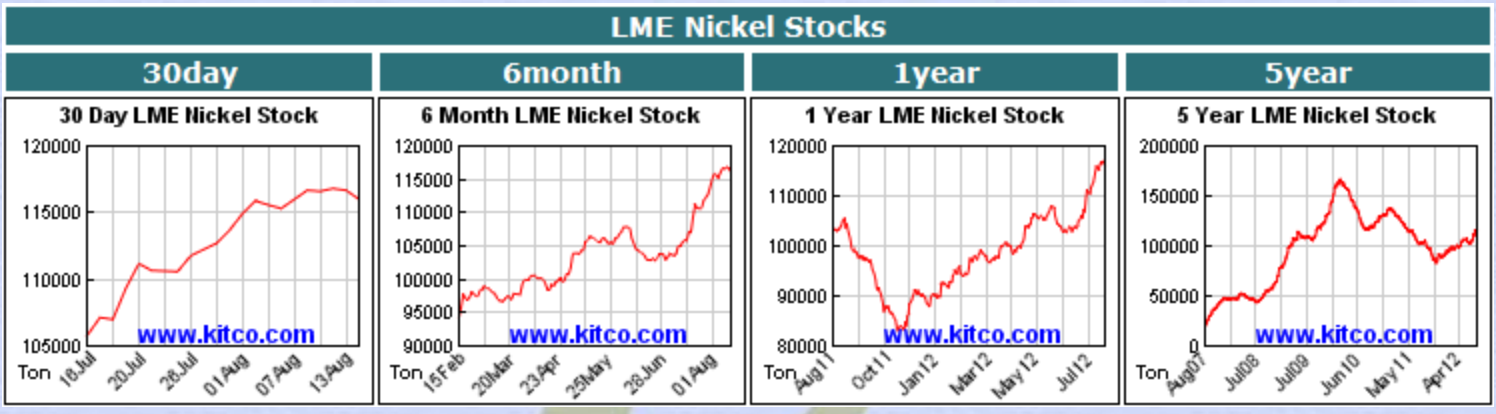
COMEX PALLADIUM FUTURES



Ferro-Nickel Nano Powder produced using CVMR's Carbonyl Nano Powder Technology

Futures (Cont…) Nickel Chart

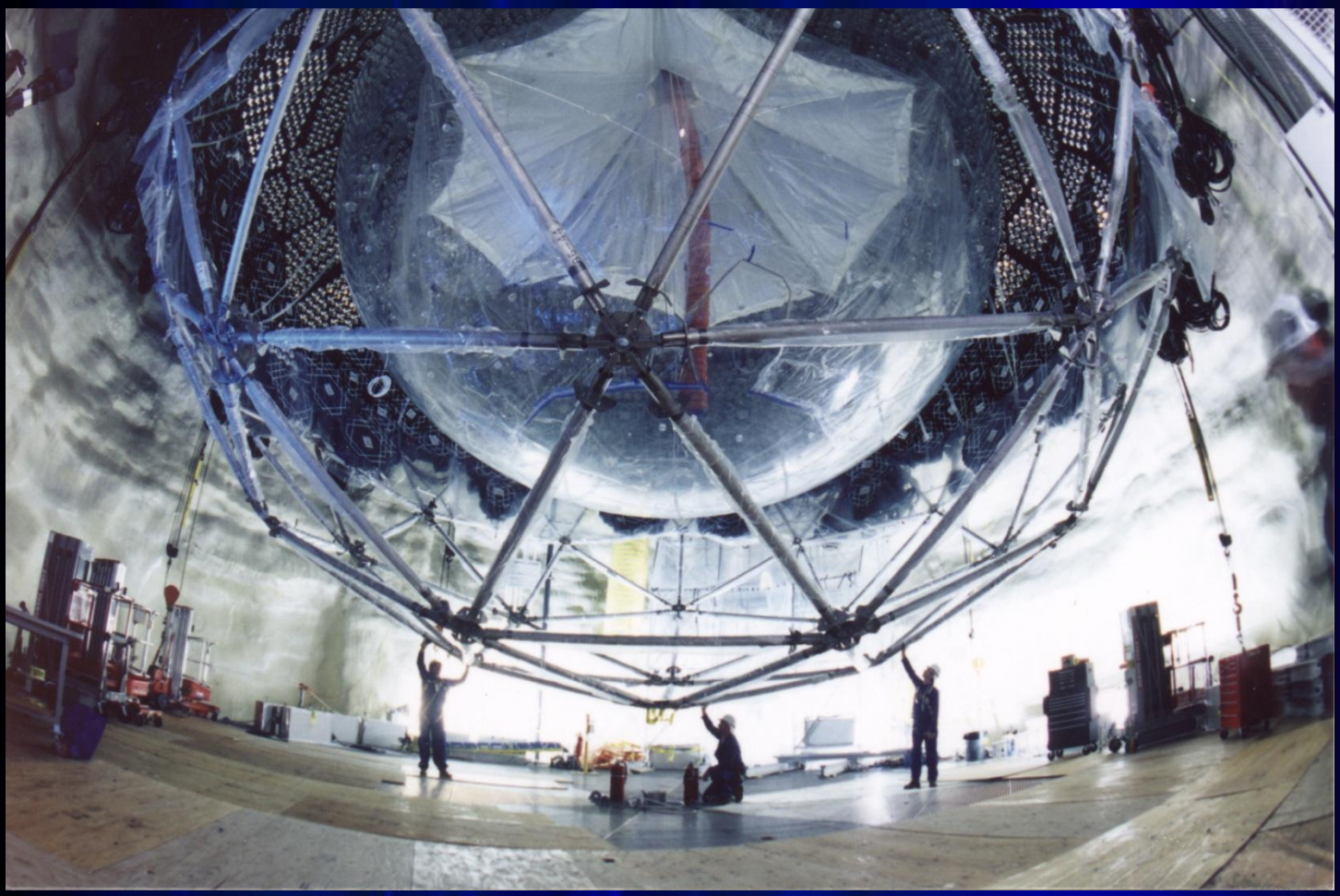




NEW DELHI: Nickel prices moved up by 0.35 per cent to Rs 886.10 per kg in futures market today after participants enlarged their positions, taking positive cues from the global market.

Further, pick up in demand from alloy-makers in the spot market also supported the upside.

At the Multi Commodity Exchange, nickel for delivery in July gained Rs 3.10, or 0.35 per cent, to Rs 886.10 per kg, with a business turnover of 3,451 lots.



Manufactured by CVD Manufacturing Inc., a subsidiary of CVMR® Corporation, for the Sudbury Neutrino Observatory, Ontario, Canada.

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