

MAGNESIUM OXIDE FOR HYDROMETALLURGY

Puyang Refractories Group Co., Ltd. (PRCO) owns a high-grade magnesite mine with independent property rights in west China. The verified reserves exploitable are above 48 million metric tons. Magnesium oxide for hydrometallurgy is manufactured through mining, beneficiation, crushing, calcination, cooling, crushing, grinding, and packaging. Microcrystalline magnesite is used as a raw material, and an energy-saving rotary kiln is utilized for calcination, with the whole manufacturing process automatically controlled by a computer.

Product features:

- High purity
- low silicon
- low iron
- no harmful elements such as chlorine and boron
- quality advantages unmatched by seawater light-burned magnesium oxide and brine light-burned magnesium oxide.

Application fields: Wet cobalt precipitation and Wet nickel precipitation.

Advantages:

1. High cobalt and nickel precipitation rates.
2. High cobalt and nickel content in hydroxides.
3. Low consumption of magnesium oxide used for cobalt and nickel precipitation.
4. High cost-effectiveness.



Fig.1 Magnesium Oxide For Hydrometallurgy

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Product	Brand Code	Chemical Analysis (Calcined Basis), %					LOI	Physical Analysis		
		Property	MgO	CaO	SiO ₂	Fe ₂ O ₃		Loose Bulk Density (g/cm ³)	Activity CAA (s)	Percentage pass through 325 mesh screen
Magnesium Oxide For wet cobalt precipitation	PN-MH006-7	Guarantee	≥95.0	≤4.0	≤0.5	≤0.1	≤3.0	≤0.5	≤45	≥99.0
		Typical	95.96	3.29	0.29	0.06	2.16	0.38	28	99.5
	PN-MH006-7C	Guarantee	≥95.0	≤4.0	≤0.5	≤0.1	≤3.0	≤0.5	≤40	≥99.5
		Typical	95.85	3.61	0.25	0.05	2.57	0.30	25	100
Magnesium Oxide For wet nickel precipitation	PN-MH006-7A	Guarantee	≥95.0	≤4.0	≤0.5	≤0.1	≤3.0	≤0.5	≤45	≥99.0
		Typical	95.88	3.29	0.29	0.06	2.16	0.38	38	99.5
	PN-MH006-7B	Guarantee	≥95.0	≤4.0	≤0.5	≤0.1	≤3.0	≤0.5	≤40	≥99.5
		Typical	95.79	3.29	0.29	0.06	2.71	0.31	32	100

Table 1: Chemical and physical properties of Magnesium Oxide For Hydrometallurgy

Brand Code	Solution after iron removal	Solution after cobalt precipitation	Cobalt precipitation rate	Metal content in cobalt hydroxide			Unit consumption of Magnesium Oxide
	Co ²⁺ /g·L ⁻¹	Co ²⁺ /g·L ⁻¹	%	Co	Mg	Mn	/T·(T·Co)-1
PN-MH006-7 (1#)	10.70	2.49	76.08	45.55	3.83	0.94	0.75
PN-MH006-7 (2#)	10.70	2.46	76.37	45.72	3.99	1.02	0.74
Average	10.70	2.48	76.22	45.64	3.91	0.98	0.74

Table 2: Third-party evaluation report

Conclusion on third-party evaluation report:

The performance test results of PN-MH006-7 magnesium oxide cobalt precipitation show that: for solutions with high cobalt content (Co 10.70 g/L), under the condition that the amount of magnesium oxide added is 0.8 times the theoretical amount of cobalt precipitation, the Co and Mg contents in the cobalt hydroxide slag obtained by cobalt precipitation are 45.64% and 3.91%, respectively, and the liquid Co precipitation rate is 76.22%. The consumption of magnesium oxide is 747.67 kg/tCo. Compared with the current operating parameters in the cobalt extraction industry (magnesium oxide consumption~1.1 t/tCo),

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the unit consumption of the tested magnesium is much lower. The Mg content in the crude cobalt hydroxide obtained by precipitation is lower than the secondary product requirement ($Mg \leq 6\%$) in the industry standard (YS/T1152-2016 crude cobalt hydroxide). This magnesium oxide sample can be used as a precipitant for wet cobalt extraction from copper cobalt ore.

Brand Code	Solution after iron removal	Solution after cobalt precipitation	Cobalt precipitation rate	Metal content in cobalt hydroxide					Unit consumption of Magnesium Oxide
	$Co^{2+}/g \cdot L^{-1}$	$Co^{2+}/g \cdot L^{-1}$	%	Co	Mg	Mn	Ca	Fe	$T \cdot (T-Co)^{-1}$
Product from Australia	8.20	0.60	92.68	37.44	6.18	2.23	0.18	0.11	1.01
PN-MH006-7	8.20	0.22	97.32	38.16	4.48	2.50	0.21	0.11	0.95

Table 3: Application case one

Brand Code	Solution after iron removal	Solution after cobalt precipitation	Cobalt precipitation rate	Metal content in cobalt hydroxide					Unit consumption of Magnesium Oxide
	$Co^{2+}/g \cdot L^{-1}$	$Co^{2+}/g \cdot L^{-1}$	%	Co	Mg	Mn	Ca	Fe	$T \cdot (T-Co)^{-1}$
Product from Australia	11.75	0.69	94.13	40.12	4.36	1.72	0.18	0.01	0.84
PN-MH006-7	11.75	0.35	97.02	40.48	4.11	2.28	0.18	0.11	0.79

Table 4: Application case two

Brand Code	Solution after iron removal	Solution after cobalt precipitation	Cobalt precipitation rate	Metal content in cobalt hydroxide					Unit consumption of Magnesium Oxide
	$Co^{2+}/g \cdot L^{-1}$	$Co^{2+}/g \cdot L^{-1}$	%	Co	Mg	Mn	Ca	Fe	$T \cdot (T-Co)^{-1}$
Product from Australia	1.41	0.40	71.60	26.48	3.61	8.67	1.14	0.01	0.84
PN-MH006-7C	1.41	0.35	75.20	26.32	2.48	10.32	0.99	0.11	0.79

Table 5: Application case three

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