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Kerone Research & Development Centre (KRDC),
B/47, Addl. MIDC. Anand Nagar, Ambernath (East), Thane- 421 506, India
Tel- +91-251-2620542/43/44/45/46, Email-info@kerone.com, www.kerone.com



**Batch Convection Heat Treatment for
Reduction of MnO₂**

ISO 9001-2008 | ISO 9001-2015 | EMS 14001 | OHSAS 18001
In Association with SVCH-Technologii, Moscow (Russia)



EUROPE ASSOCIATION of Metallurgical Engineers



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Customer :	Baidyanath Minerals Pvt Ltd
Process :	Batch Convection Heat Treatment for Reduction/Roasting of MnO ₂

TEST REPORT No: 47/KRDC/LAB/17 Mum 23/03/2021

Date Sample reception : 03/11/2020

ID : 47/LAB/198

SAMPLE DESCRIPTION:

Sampling : As Requested

Sample Condition : Acceptable

Quantity : 2 nos. of bags

Samples opening date : 26/11/2020

Product : MnO₂ Powder & Coal

Start Date test : 19/03/2021

End Date test : 22/03/2021

LABORATORY EXPERIMENTAL SET UP:



Format: F/R&D/01



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LAB BATCH CONVECTION HEATING SYSTEM SPECIFICATIONS:

Heating Zone (width*height*depth)	450*450*600 mm
No. of Heater Element	12
Total Heater Power	12 kW
No. of crucibles	4
Crucible size (diameter*height)	100*50 mm

ENVIRONMENT-LABORATORY AMBIENT CONDITIONS:

Temperature (°C)	35°C (±5°C)
Humidity (%)	≤65% RH
Pressure (kN/m ² or kPa)	Not recorded




Note for recommendation: Environmental conditions have a direct impact on test results. Accuracy and consistency of test data are affected by the laboratory conditions



EUROPE ASSOCIATION of Manufacturers and Suppliers

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EQUIPMENTS USED:

Name of Equipment	Picture of Equipment	Specifications
Compact Thermal Imaging Camera		Model: FLUKE 566 Resolution: 0.1° IR Thermal sensitivity of -40°C to 900°C
Moisture Analyzer		Make: Axis Balance Description: Moisture range: 1%(sample 0.02/0.05g), 0.1% (Sample 0.5/5g), 0.01%(Sample>5g)
Hot Air		Make: Kerone Power: 6KW Tray Quantity: 4Nos.

SAMPLE PREPARATION AND METHOD/PROCEDURE:

The experiment has been performed on MnO₂ powder for reduction and converting in MnO powder. For this experimental run, given MnO₂ samples and coal added together in specific proportion. Sample has been placed in small ceramic container inside oven which was preheated at 300°C.

After holding material at 300°C for certain drying time, exhausted port and fresh air intake port closed to eliminate oxidization process.

After treatment, samples removed from chamber and immediately quenched in water. After cooling down MnO powder filtered out from the water and dried in Hot Air Dryer System.

Format: F/R&D/01



ANALYTICAL RESULTS:

1) Trial A

Setting Temperature: 850°C.

Temperature rising seed: 5°C/min.

Total Exposure time: 170mins.

Sr. No.	MnO2 & Coal Ratio		Total Weight of MnO2+Coal Mixture (gm)	Moisture content after quenching & Air Drying (%)
	MnO2 (%)	Coal (%)		
1.	85	15	13	0.33
2.	80	20	13	0.4
3.	70	30	13	0.76
4.	60	40	13	0.75

2) Trial B

Setting Temperature: 850°C.

Temperature rising seed: 5°C/min.

Total Exposure time: 200mins.

Sr. No.	MnO2 & Coal Ratio		Total Weight of MnO2+Coal Mixture (gm)	Moisture content after Air Drying (%)
	MnO2 (%)	Coal (%)		
1.	85	15	13	0.3
2.	80	20	13	0.23
3.	70	30	13	0.36
4.	60	40	13	0.45



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AFTER PICTURES OF TREATED SPECIMEN SAMPLE:



OBSERVATIONS:

The heating behavior of MnO_2 has been investigated under the convection heating system. The drying & heating rate is found to be increasing with respect to increase in time. It has been found that the moisture content on the dry basis (%) decreases with respect to increase in drying time. As per physical investigation, it has been observed that no colour change and ferrite formation observed.

Miss Komal Bhoite
Tested By