

**Laboratory** Advanced Characterization Centre (Analytical Facilities), Innovation & Knowledge Centre, Ashapura Minechem Ltd., Plot No. 206, Madhapar, Bhuj-Kutch, Gujarat  
**Accreditation Standard** ISO/IEC 17025: 2005  
**Certificate Number** TC-6483 **Page 1 of 9**  
**Validity** 03.11.2017 to 02.11.2019 **Last Amended on** --

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
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#### CHEMICAL TESTING

<b>I.</b>	<b>ORES &amp; MINERALS</b>			
<b>1.</b>	<b>Bentonite</b>	Chemical analysis by XRF		
		SiO <sub>2</sub>	IKC/ACC/INS01/XRF/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	47 % to 77 %
		Al <sub>2</sub> O <sub>3</sub>		8 % to 22 %
		Fe <sub>2</sub> O <sub>3</sub>		1 % to 18 %
		TiO <sub>2</sub>		0.1 % to 4 %
		CaO		1 % to 4 %
		MgO		1 % to 4 %
		Na <sub>2</sub> O		0.5 % to 4 %
		K <sub>2</sub> O		0.1 % to 2 %
		SO <sub>3</sub>		0.01 % to 1 %
		Loss on Ignition	IS:12107 (Part-1): 1987 (RA 2017)	4 % to 12 %
		Trace element analysis by ICP		
		Pb	IKC/ACC/INS08/ICP/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	1 mg/L to 20 mg/L
		As		0.1 mg/L to 5 mg/L
		Cd		0.1 µg/L to 5 µg/L
		Hg		0.1 µg/L to 5 µg/L
		Mineralogy by XRD		
		Montmorillonite	IKC/ACC/INS02/XRD/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	65 % to 90 %
		Quartz		1 % to 5 %
		Calcite		1 % to 10 %
		Cristoballite		15 % to 25 %
		Kaolin		1 % to 15 %
		Hematite		1 % to 10 %
		Maghemite		1 % to 10 %
		Anatase		1 % to 4 %

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		Particle size by Malvern		
		d10	IKC/ACC/INS03/PSD/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	0.5 $\mu\text{m}$ to 3 $\mu\text{m}$
		d50		3 $\mu\text{m}$ to 15 $\mu\text{m}$
		d90		10 $\mu\text{m}$ to 50 $\mu\text{m}$
		Microstructure by SEM		
		Surface Morphology, Grain Size	IKC/ACC/INS04/SEM/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	Qualitative
		Thermal Analysis by TG-DTA		
		Wt. Loss w.r.t. Temp. & Type of reaction Endo/Exo-Thermic	IKC/ACC/INS07/DTA/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	Qualitative
		Surface Area by BET		
2.	Attapulгите	Surface Area	IKC/ACC/INS09/BET/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	1 $\text{m}^2/\text{g}$ to 100 $\text{m}^2/\text{g}$
		Chemical analysis by XRF		
		SiO <sub>2</sub>	IKC/ACC/INS01/XRF/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	40 % to 70 %
		Al <sub>2</sub> O <sub>3</sub>		5 % to 15 %
		Fe <sub>2</sub> O <sub>3</sub>		2 % to 12 %
		TiO <sub>2</sub>		0.1 % to 4 %
		CaO		1 % to 15 %
		MgO		5 % to 15 %
		Na <sub>2</sub> O		0.1 % to 1 %
		K <sub>2</sub> O		0.1 % to 3 %
		SO <sub>3</sub>		0.01 % to 1 %
		Loss on Ignition	IS:12107 (Part-1): 1987 (RA 2017)	10 % to 25 %
		Trace element analysis by ICP		
		Pb	IKC/ACC/INS08/ICP/16-17	1 mg/L to 20 mg/L

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		As	Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	0.1 mg/L to 5 mg/L
		Cd		0.1 µg/L to 5 µg/L
		Hg		0.2 µg/L to 5 µg/L
		Mineralogy by XRD	IKC/ACC/INS02/XRD/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	
		Palygorskite		40 % to 80 %
		Montmorillonite		1 % to 10 %
		Calcite		5 % to 25 %
		Dolomite		2 % to 30 %
		Quartz		5 % to 30 %
		Hematite		1 % to 5 %
		Anatase		1 % to 4 %
		Particle size by Malvern		
		d10 (µm)		0.5 µm to 3 µm
		d50 (µm)	IKC/ACC/INS03/PSD/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	3 µm to 15 µm
		d90 (µm)		10 µm to 50 µm
		Microstructure by SEM	IKC/ACC/INS04/SEM/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	
		Surface Morphology, Grain Size		Qualitative
		Thermal Stability by TG-DTA		
		Wt. Loss w.r.t. Temp. & Type of reaction Endo/Exo-Thermic	IKC/ACC/INS07/DTA/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	Qualitative
		Surface Area by BET	IKC/ACC/INS09/BET/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	
		Surface Area		1 m <sup>2</sup> /g to 230 m <sup>2</sup> /g
3.	Kaolin	Chemical analysis by XRF		
		SiO <sub>2</sub>	IKC/ACC/INS01/XRF/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	30 % to 60 %
		Al <sub>2</sub> O <sub>3</sub>		20 % to 55 %
		Fe <sub>2</sub> O <sub>3</sub>		0.1 % to 3 %

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		TiO <sub>2</sub>		0.1 % to 3 %
		CaO		0.1 % to 3 %
		MgO		0.01 % to 1 %
		Na <sub>2</sub> O		0.01 % to 1 %
		K <sub>2</sub> O		0.01 % to 2 %
		SO <sub>3</sub>		0.01 % to 1 %
		Loss on Ignition	IS:12107 (Part-1): 1987 (RA 2017)	0.1 % to 20 %
		Trace element analysis by ICP		
		As	IKC/ACC/INS08/ICP/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	0.01 mg/L to 25 mg/L
		Pb		1 mg/L to 150 mg/L
		Cr		0.01 mg/L to 10 mg/L
		Mineralogy by XRD		
		Kaolin	IKC/ACC/INS02/XRD/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	40 % to 100 %
		Quartz		1 % to 80 %
		Anatase		1 % to 5 %
		Mica		1 % to 2 %
		Cristobalite		1 % to 20 %
		Mullite		55 % to 70 %
		Amorphous		20 % to 100 %
		Corundum		1 % to 5 %
		Particle size by Malvern		
		d10	IKC/ACC/INS03/PSD/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	0.4 µm to 2 µm
		d50		1 µm to 35 µm
		d90		5 µm to 230 µm
		Particle size by Sedigraph		
		10 µm	IKC/ACC/INS05/SDG/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	80 % to 100 %
		5 µm		60 % to 100 %
		2 µm		40 % to 100 %
		Microstructure by SEM		
		Surface Morphology,	IKC/ACC/INS04/SEM/16-17	Qualitative

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		Grain Size	Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	
		Thermal Stability by TG-DTA		
		Wt. Loss w.r.t. Temp. & Type of reaction Endo/Exo-Thermic	IKC/ACC/INS07/DTA/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	Qualitative
		Surface Area by BET		
		Surface Area	IKC/ACC/INS09/BET/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	1 m <sup>2</sup> /g to 30 m <sup>2</sup> /g
4.	Feldspar	Chemical analysis by XRF		
		SiO <sub>2</sub>	IKC/ACC/INS01/XRF/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	55 % to 85 %
		Al <sub>2</sub> O <sub>3</sub>		15 % to 25 %
		Fe <sub>2</sub> O <sub>3</sub>		0.01 % to 1 %
		TiO <sub>2</sub>		0.01 % to 1 %
		CaO		0.01 % to 1 %
		MgO		0.01 % to 1 %
		Na <sub>2</sub> O		1 % to 15 %
		K <sub>2</sub> O		1 % to 15 %
		SO <sub>3</sub>		0.01 % to 1 %
		Loss on Ignition	IS:9749: 2007 (RA 2017)	0.1 % to 2 %
		Microstructure by SEM		
		Surface Morphology, Grain Size	IKC/ACC/INS04/SEM/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	Qualitative
		Thermal Stability by TG-DTA		
		Wt. Loss w.r.t. Temp. & Type of reaction Endo/Exo-Thermic	IKC/ACC/INS07/DTA/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	Qualitative

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5.	Aluminum Ores			
a.	Bauxite	Chemical analysis by XRF		
		SiO <sub>2</sub>	IKC/ACC/INS01/XRF/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	1 % to 16 %
		Al <sub>2</sub> O <sub>3</sub>		45 % to 90 %
		Fe <sub>2</sub> O <sub>3</sub>		1 % to 15 %
		TiO <sub>2</sub>		1 % to 10 %
		CaO		0.1 % to 2 %
		MgO		0.1 % to 2 %
		Na <sub>2</sub> O		0.01 % to 1 %
		K <sub>2</sub> O		0.01 % to 1 %
		SO <sub>3</sub>		0.1 % to 5 %
		Loss on Ignition	IS:2000 (Part-1): 1985 (RA 2017)	0.1 % to 35 %
		Mineralogy by XRD		
		Gibbsite	IKC/ACC/INS02/XRD/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	65 % to 85 %
		Goethite		1 % to 5 %
		Kaolin		1 % to 20 %
		Quartz		1 % to 10 %
		Anatase		1 % to 10 %
		Hematite		1 % to 10 %
		Maghemite		1 % to 10 %
		Corundum		75 % to 90 %
		Mullite		1 % to 10 %
		Amorphous		1 % to 20 %
		FAT		1 % to 10 %
		Particle size by Malvern		
		d10	IKC/ACC/INS03/PSD/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	0.5 µm to 2 µm
		d50		3 µm to 15 µm
		d90		15 µm to 75 µm
		Microstructure by SEM		
		Surface Morphology, Grain Size	IKC/ACC/INS04/SEM/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	Qualitative

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		Thermal Stability by TG-DTA		
		Wt. Loss w.r.t. Temp. & Type of reaction Endo/Exo-Thermic	IKC/ACC/INS07/DTA/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	Qualitative
		Surface Area by BET		
		Surface Area	IKC/ACC/INS09/BET/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	1 m <sup>2</sup> /g to 200 m <sup>2</sup> /g
<b>6.</b>	<b>Silica Sand</b>			
<b>a.</b>	<b>Quartz &amp; Silica Sand</b>	Trace element analysis by ICP		
		Al <sub>2</sub> O <sub>3</sub>	IKC/ACC/INS08/ICP/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	0.01 % to 10 %
		Fe <sub>2</sub> O <sub>3</sub>		0.01 % to 2 %
		TiO <sub>2</sub>		0.01 % to 5 %
		CaO		0.01 % to 4 %
		MgO		0.01 % to 2 %
		Na <sub>2</sub> O		0.01 % to 2 %
		K <sub>2</sub> O		0.01 % to 2 %
		SO <sub>3</sub>		0.01 % to 2 %
		Loss on Ignition	IS:1917 (Part-1): 1992 (RA 2017)	0.1 % to 2 %
		Microstructure by SEM		
		Surface Morphology, Grain Size	IKC/ACC/INS04/SEM/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	Qualitative
<b>7.</b>	<b>Limestone and Dolomite</b>			
<b>a.</b>	<b>Calcite, Limestone</b>	Chemical analysis by XRF		
		CaO	IKC/ACC/INS01/XRF/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	45 % to 56 %
		SiO <sub>2</sub>		0.1 % to 5 %
		Al <sub>2</sub> O <sub>3</sub>		0.1 % to 2 %
		Fe <sub>2</sub> O <sub>3</sub>		0.01 % to 1 %
		MgO		0.1 % to 5 %

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		Loss on Ignition	IS:1760 (Part-1): 1992 (RA 2017)	35 % to 45 %
		Mineralogy by XRD		
		Calcite	IKC/ACC/INS02/XRD/16-17	70 % to 100 %
		Dolomite	Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	1 % to 30 %
		Particle size by Malvern		
		d10	IKC/ACC/INS03/PSD/16-17	0.5 µm to 1.5 µm
		d50	Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	2.5 µm to 20 µm
		d90		6.0 µm to 50 µm
		Microstructure by SEM		
		Surface Morphology, Grain Size	IKC/ACC/INS04/SEM/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	Qualitative
		Thermal Stability by TG-DTA		
		Wt. Loss w.r.t. Temp. & Type of reaction Endo/Exo-Thermic	IKC/ACC/INS07/DTA/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	Qualitative
b.	Dolomite	Chemical analysis by XRF		
		SiO <sub>2</sub>	IKC/ACC/INS01/XRF/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	0.1 % to 2 %
		Al <sub>2</sub> O <sub>3</sub>		0.1 % to 5 %
		Fe <sub>2</sub> O <sub>3</sub>		0.01 % to 1 %
		CaO		20 % to 40 %
		MgO		15 % to 30 %
		Los on Ignition	IS:1760 (Part-1): 1992 (RA 2017)	40 % to 47 %
		Mineralogy by XRD		
		Calcite	IKC/ACC/INS02/XRD/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	1 % to 30 %
		Dolomite		70 % to 100 %



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		Particle size by Malvern		
		d10	IKC/ACC/INS03/PSD/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	0.5 µm to 1.5 µm
		d50		2.5 µm to 20 µm
		d90		6.0 µm to 50 µm
		Microstructure by SEM		
		Surface Morphology, Grain Size	IKC/ACC/INS04/SEM/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	Qualitative
		Thermal Stability by TG-DTA		
		Wt. Loss w.r.t. Temp. & Type of reaction Endo/Exo-Thermic	IKC/ACC/INS07/DTA/16-17 Issue No: 01, Revision No: 00, Issue Date: 01/01/2017	Qualitative