



Samio Minerals® is a leading Mineral Mining, Processing and Export firm having its registered office at Rajkot and Plant in Kachchh - Gujarat. Minerals such as Bentonite, Laterite and Bauxite are processed in our plant and after stringent Quality tests are dispatched to end-users. Presently, the rate of Bentonite mining from our quarry area is earmarked to be around 144000 MTPA. The firm is looking forward to enhance its production capacity by going in for additional mining lease of Bentonite.

Bauxite

Bauxite mining is an exclusive prerogative of the government of Gujarat, while private firms can only undertake the processing activities as understood. Bauxite is a rock formed from a reddish clay material called laterite soil and is most commonly found in tropical or subtropical regions. Bauxite is an aluminium-rich ore that is used for producing aluminium, refractory materials, specialized chemicals and cements.

Bentonite

This mineral is a clay generated frequently from the alteration of volcanic ash; it is extensively used as Drilling mud, binder, sealing agent, purifier, absorbent and ground barrier. Bentonite largely consists of a key ingredient called montmorillonite, a clay mineral. There are two types of Bentonite, the Sodium and Calcium type; the former is a swelling type and the latter is a non-swelling type.

Laterite

This mineral is a soil and rock type rich in iron and aluminium and is commonly considered to have formed in hot and wet tropical areas. The compact and ferruginous variety of laterite is used widely as a building stone and road metal. Most popular use of Laterite is in the Cement industry wherein it is used as an additive for lowering the clinkerisation temperature and supplementing aluminous and iron contents required in the manufacturing of high-quality cement.



Samio Minerals® is major supplier of Sodium Bentonite in the form of natural lumps, activated and/or granular ones, strictly adhering to the Bentonite specifications laid down by the end-users from Iron-Ore Pellet Industry, Oil and Gas Industry, Foundry Industry et. al. Working of bentonite often involves selective mining, blending and processing to achieve the required grade. The Bentonite parameters (drilling mud grade, pellet industry grade and foundry grade) can very well be tested at our in-house laboratory.

Processing:

The processing involves drying, grinding, sizing and at times use of additive for cation exchange. The Bentonite mined at the beginning is first graded and sun-dried before pulverisation. Bentonite is processed generally by simple milling techniques that involve removal of water and volatile matter like carbon dioxide, if present, and grinding it to the appropriate sizes. Small amount of chemicals like soda ash are added sometimes before grinding to control the properties of bentonite. Raw bentonite when delivered to the processing plant contains 25 to 40% moisture. It is, therefore, dried in dryers and the dried clay is ground in roll and hammer mills or other pulverisers and screened. Most of the bentonite is ground to approximately 90% finer than 200 mesh.

Bentonite has special properties such as hydration, swelling, water absorption, viscosity, thixotropy etc. and has extensive use in the following areas: Drilling mud (petroleum engineering - oil wells); binder (iron-ore pelletisation, water proofing, foundry sand binding); sealing agent (civil engineering); purifier; absorbent (pet litter) and ground barrier to name a few.

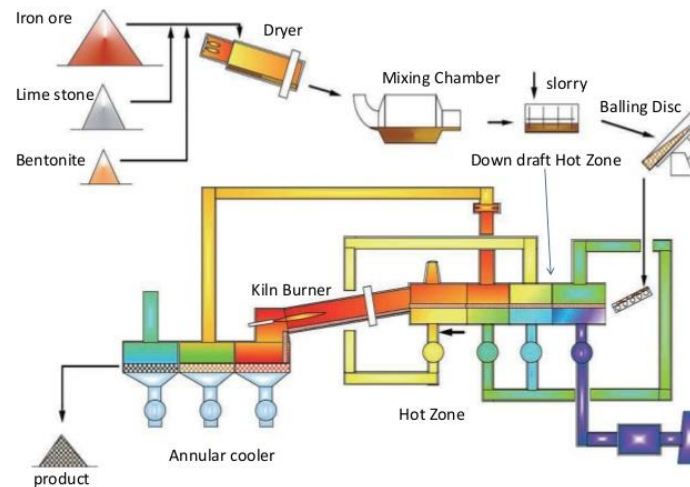
On the supply front - domestic and export, Samio Minerals® has a natural logistical advantage as it is situated along the Gulf of Kutch on the Western coast-line of India. Our mining and mineral processing facility is close to both the seaports, namely, Mundra port (approx. 40 km) and Kandla port (approx. 100 km). The seaports are deep water type, all weather ports, and can berth even Cape-sized ships. However, the road and rail transport too are convenient and has a healthy track record of providing timely services.

Samio Minerals® is registered with the following ministries of Government of India and is well poised to cater to the needs of Bentonite mineral, to both domestic and foreign markets:

- Ministry of Commerce and Industry, Office of Joint Director General of Foreign Trade
- Ministry of Micro, Small and Medium Enterprises

Bentonite in Iron-Ore Pellet Industry

During pelletisation process, the proportion of Bentonite added to Iron-ore is in the proportion of 0.5%. Adding bentonite improves the strength of the green pellet. The falling strength and compression strength of green pellet increase as bentonite content increases.



Desired Specification of Bentonite in Pellet industry (Case study):

Type	Parameter	Test results
Physical Properties	Moisture	14% maximum
	Structure	a) 5% - 100 mesh
		b) Max. Particle size 40 mm
Grit for crude	Max. 5% - 325 mesh	
Process Properties	18" green drop number	8 minimum
	Green Compression Strength	0.612 kg minimum
	Dry Compression Strength	4 kg minimum
	Sintered Plate Water Absorption value	700 minimum
	Colloids	70% minimum
	Moisture Swelling Value/Swelling Index	30 ml minimum
	Gel formation Index	60 ml minimum
	Methylene Blue Absorption (MBA)	400 mg/g minimum
Chemical Properties	CaO (Calcium Oxide)	1.5% maximum
	Na ₂ O (Sodium Oxide)	2.0% minimum
	Ratio of Na ₂ O to CaO	02:01
	SiO ₂	55 - 62%
	Al ₂ O ₃	10 -13%
	Fe ₂ O ₃	12 - 15%
	MgO	2 - 3%
	P	0.045% maximum
	S	0.008% maximum
	K ₂ O	0.1 - 0.5%
	Loss on Ignition (LOI)	8 - 12%

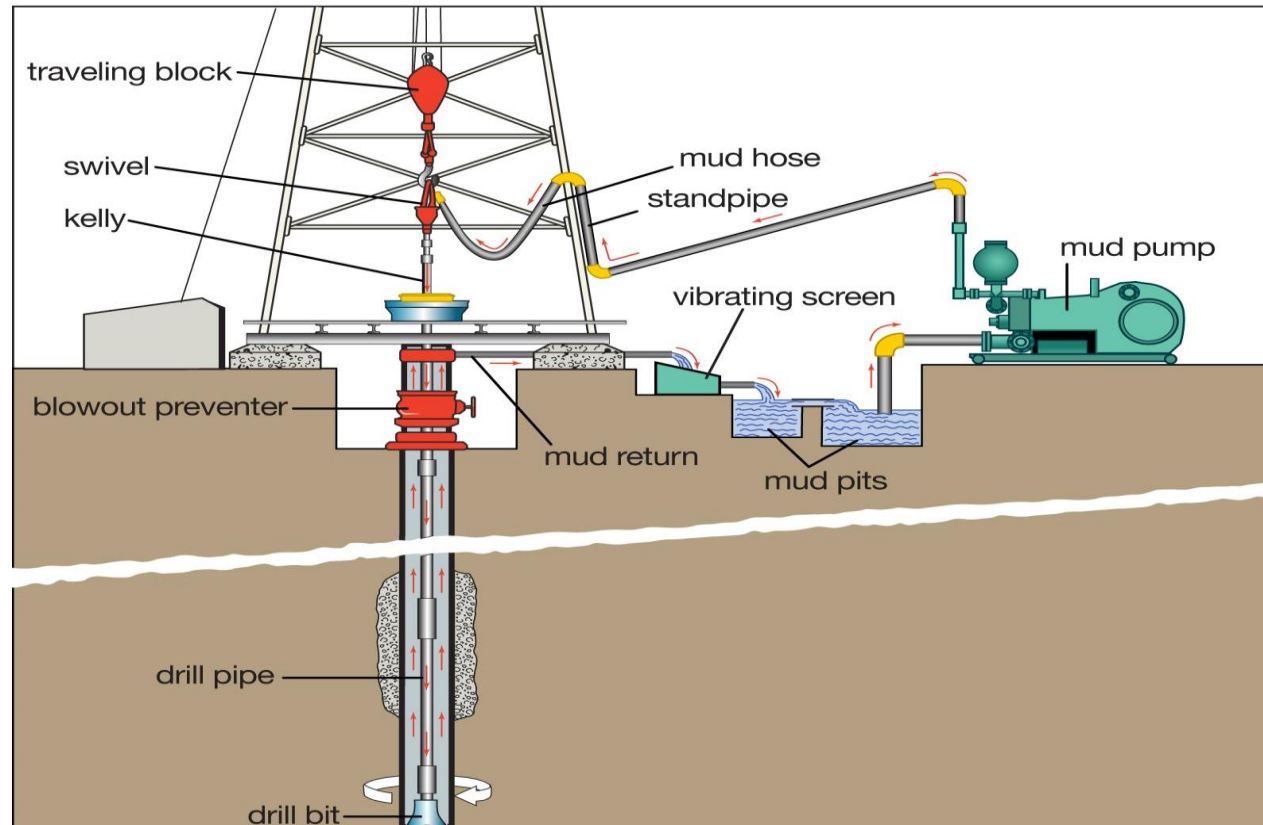
Bentonite as Drilling Mud in Excavation Industry:

Oil and Gas engineering - Bentonite as Drilling Mud in Oil wells

In Oil and Gas drilling operations it is required to carry rock cuttings to the surface and also lubricate and cool the drill bit. The drilling mud which is a heavy viscous fluid mixture serves the above purpose. The drilling mud, by hydrostatic pressure, also helps prevent the collapse of unstable strata into the borehole and the intrusion of water from water-bearing strata that may be encountered (courtesy: Encyclopædia Britannica, *Inc.*).



Below image shows the circulation of drilling mud during the drilling of an oil well.





American Petroleum Institute (API) Standard

Test results of our Bentonite vis'a'vis standard set-forth by American Petroleum Institute API -13 A Section - 9

Sl. No.	Test Parameter	Units	Samio Minerals Sample Result	API-13A Section-9
1	Viscosity dial reading @ 600 rpm	-	32	30 Minimum
2	Yield point/Plastic viscosity ratio	-	2.62	3 Maximum
3	Filtration Loss, cc	-	14.57	15 cc Maximum
4	Wet residue>75 micron, % wt.	-	2.34	4% Maximum
5	Viscosity dial reading @ 300 rpm	-	25	No mention in code
6	Moisture, % wt.	-	2.60	No mention in code
	Chemical Composition	Units	Result	Test Method
7	Alumina as Al ₂ O ₃ , % wt.	%	16.15	IS:2000-1985
8	Sodium as Na ₂ O, % wt.	%	2.47	IS:2000-1985
9	Calcium as CaO, % wt.	%	1.82	IS:2000-1985
10	Iron as Fe ₂ O ₃ , % wt.	%	13.59	IS:2000-1985
11	Magnesium as MgO, % wt.	%	1.86	IS:2000-1985
12	Silica as SiO ₂ , % wt.	%	49.28	IS:2000-1985
13	LOI, % wt.	%	9.54	IS:2000-1985
14	Potassium as K ₂ O, % wt.	%	0.86	IS:2000-1985
15	Titanium as TiO ₂ , % wt.	%	2.05	IS:2000-1985
16	Specific Gravity	-	2.39	IS:2000-1985

Bentonite as foundry Sand in Foundry Industry (Specification as per industry standard):

Bentonite Powder - Parameter	Foundry Grade test results
Moisture	10 - 12%
Swelling Capacity 2 gms	30 ml plus
Methylene Blue Value	420 plus
Base Exchange Capacity	80 meq
Gelling time in min. of 10% B.slurry	Instant
Gel formation Index	70
pH at 5%	9.5
Liquid Limit	600 plus
Sieve Analysis % Passing Thru	100 & 200 mesh - 99% & 90%
Green Compression Strength	1200 Kg/sq.cm
Wet Tensile Strength	0.38 N/sq.cm
Loose Bulk Density	0.85 G/cu.cm
Montmorillonite	90%
Cao (Calcium Oxide)	1.5% maximum
Na ₂ O (Sodium Oxide)	2.2% minimum
SiO ₂	56-60%
Al ₂ O ₃	16-20%
Fe ₂ O ₃	8-11%
MgO	1 - 3%
K ₂ O	1%
Loss on Ignition (LOI)	8 - 12%
