

DIATOMITE



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**DIATOMITE**

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# 15 Diatomite

Diatomite is a sedimentary rock that is white and yellowish in colour. It is composed of fossilised remains of unicellular aquatic algae-like plants called diatoms which are both marine & lacustrine in origin. Diatomite has the ability to absorb soluble silica to form a highly porous skeletal framework. The dead remains of these diatoms over the ages have fossilised and formed the deep-bedded deposits in ocean & lake floors, owing to upheaval process, some rose to become the present day land mass as well. The special properties of diatomite, i.e, light weight, high porosity & high absorptivity have facilitated its application as filter medium and absorbents. It is chemically inert & highly stable. The diatomite consists of approximately 90 percent silica and the

remainder consists of compounds, such as, aluminium and iron oxides. It is also called 'Kieselguhr'. Almost the entire domestic requirement of diatomite is met through imports.

## RESOURCES

The occurrences of diatomite are reported from Gujarat, Rajasthan, Tamil Nadu, Andhra Pradesh and Camorta & Trincat Islands in Andaman and Nicobar archipelago. As per UNFC system, the total resources of diatomite as on 1.4.2010 is estimated at 2.89 million tonnes, all of which fall under remaining resources. The Resources are distributed in Rajasthan (72%) and Gujarat (28%) (Table - 1).

**Table – 1: Reserves/Resources of Diatomite as on 1.4.2010  
(By Grades/States)**

(In '000 tonnes)

Grades/State	Reserves Total (A)	Remaining Resources			Total Resources (A+B)
		Feasibility STD211	Inferred STD333	Total (B)	
<b>All India: Total</b>	–	<b>634</b>	<b>2251</b>	<b>2885</b>	<b>2885</b>
<b>By Grade</b>					
Unclassified	–	634	2251	2885	2885
<b>By States</b>					
Gujarat	–	–	811	811	811
Rajasthan	–	634	1440	2074	2074

Figures rounded off.

## PRODUCTION

Production of diatomite has not been reported since 1991-92. Pandava and Khadriliya areas in Bhavnagar district, Gujarat were the producing areas prior to 1991-92.

## USES

Diatomite is commonly used after calcination in plate and frame filter units. Processed diatomite finds a wide range of applications due to its properties like porosity, low bulk density, soluble impurities, high absorptive capacity for liquids, large surface area, low thermal conductivity, mild abrasive nature and chemical inertness.

Diatomite is an excellent filtering material for many liquids especially beverages, fruit juices, soft drinks, beer and wine. It is used in chemicals like sodium hydroxide, sulphuric acid, and gold salts. Filtration of cooking oils (vegetable and animal) and sugar (cane, beet and corn) is an application where diatomite is predominantly used. It is also used as an absorbent of vegetable oil, polyethylene, rayon liquors and as a flattening agent in paint, plastic, rubber, drugs, toothpaste, polishes and chemicals. Diatomite is utilised for safe handling and storage of hazardous chemicals like sulphuric acid. Besides, diatomite is also used as an abrasive in metal polishing in automobiles

## DIATOMITE

and toothpastes; as pozzolanic admixtures in Cement Industry; as animal feed stuff conditioners; and in explosives. It is also used as a coating material in the manufacture of ammonium nitrate fertilizer which is hygroscopic. Diatomite clay is the new revolution in hydroponics. In pharmaceuticals, it is used to filter syrups and other bulk drugs in liquid form. It is used as a facial exfoliator to promote skin health. Research has also shown that food-grade diatomaceous earth may offer positive benefits for controlling cholesterol levels which in turn would improve heart health. In Oil Industry, before packing, it is used for filtering oil which not only gives it a shine but also helps in removing any suspended impurity. Wine and Beer is filtered through diatomite filters before packing to remove molasses. Filter candles are made from diatomite filter aids for drinking water purification. Processed diatomite granules 15 to 50 mm, are used in denim wash (commonly known as stonewash) to give it shine and design.

Diatomite is also used as caking agent in fertilizers, plastics and as a natural insecticide for organic pest control. Potable water treatment and biological filtration are areas of expansion in diatomite consumption.

### SUBSTITUTION

Many substances are used as substitutes for diatomite. However, the unique properties of diatomite assure its continuance in many applications. Expanded perlite and silica sand are considered as viable substitutes of diatomite for filtration purposes. Other filtration technologies use ceramic, polymeric or carbon membrane. Alternate filler materials include talc, ground silica sand, ground mica, clay, perlite, vermiculite and ground limestone. For thermal insulation materials, such as, various clays & special brick, mineral wool, expanded perlite and exfoliated vermiculite can be used.

### WORLD REVIEW

World resources of crude diatomite are adequate for the foreseeable future. The USA has the largest reserves at 250 million tonnes followed by China with 110 million tonnes and Turkey with 44 million tonnes. World's largest producing district in terms of volume is near Lompoc, CA in USA (Table- 2).

The total world diatomite production increased by about 6% to 2.27 million tonnes in 2014 from 2.14 million tonnes in the previous year. The USA dominated the world production by accounting for (35%) output which was followed by China (19%), Peru (7%), Denmark (5%) and Japan, France & Mexico (4% each). Production in Denmark was mostly of molar, an impure mixture that includes diatomite (Table- 3).

**Table – 2: World Reserves of Diatomite  
(By Principal Countries)**

(In '000 tonnes)	
Country	Reserves
<b>World: Total (rounded)</b>	<b>Large</b>
USA	250000
China	110000
Argentina	NA
Denmark (processed)	NA
France	NA
Japan	NA
Mexico	NA
Peru	NA
Russia	NA
Spain	NA
Turkey	44000
Other countries	NA

*Source: Mineral Commodity Summaries, 2016.*

**Table – 3: World Production of Diatomite  
(By Principal Countries)**

(In '000 tonnes)			
Country	2012	2013	2014
<b>World : Total</b>	<b>2031</b>	<b>2140</b>	<b>2265</b>
USA	735	782	800 <sup>°</sup>
China <sup>°</sup>	420	420	430
Denmark (Molar)*	111	128	119
Japan <sup>°</sup>	100	90	100
Mexico	85	87	88
Peru	94	125	151
France <sup>°</sup>	85	85	90
Argentina	55	55 <sup>°</sup>	55 <sup>°</sup>
Spain <sup>@</sup>	61	54	60
Turkey	86	85	85 <sup>°</sup>
Other countries	199	229	287

*Source: World Mineral Production, 2010-2014.*

\* Molar is an impure diatomite containing a large proportion of clay; @ Including Tripoli.

DIATOMITE

**FOREIGN TRADE**

Although there is no reported production of diatomite in Inida, the country did export diatomite to a tune of 87,845 tonnes in 2014-15 as against 58,265 tonnes in the previous year. Almost the entire export was to Saudi Arabia (98%) (Table-4).

Exports of kieselguhr decreased to 137 tonnes in 2014-15 from 196 tonnes in the previous year. Exports were mainly to China (51%), Switzerland (37%) and Sri Lanka (12%). There were no exports of tripoli earth in both the years, i.e, 2013-14 and 2014-15 (Table-5).

Imports of diatomite decreased to 2,122 tonnes in 2014-15 from 6,006 tonnes in the previous year. Imports were mainly from USA (65%) which was followed by Mexico (26%) and China (5%) (Table-6).

Imports of kieselguhr remained the same at 20 tonnes in 2014-15 as in 2013-14. Imports of kieselguhr were solely from Netherlands (Table-7).

Imports of tripoli earth are reflected as 'nil' in 2014-15 as against 19 tonnes in the previous year (Table-8).

**Table – 4: Exports of Diatomite (By Countries)**

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>58265</b>	<b>521672</b>	<b>87845</b>	<b>778088</b>
Saudi Arabia	57463	509648	86354	756656
Chinese Taipei/ Taiwan	432	4792	707	7804
Australia	-	-	87	3622
Sri Lanka	37	801	34	2164
Malaysia	18	651	70	2006
Ecuador	52	706	104	1449
Oman	36	957	45	1220
UAE	122	3002	24	625
France	-	-	3	463
Bangladesh	54	394	14	444
Other countries	51	721	403	1635

**Table – 5: Exports of Kieselguhr (By Countries)**

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>196</b>	<b>2984</b>	<b>137</b>	<b>2494</b>
Switzerland	14	652	51	1264
China	70	964	70	928
Sri Lanka	-	-	16	240
Mauritius	-	-	++	38
Nepal	16	37	++	24
Other countries	96	1331	++	0

**Table – 6: Imports of Diatomite (By Countries)**

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>6006</b>	<b>186713</b>	<b>2122</b>	<b>87085</b>
USA	5156	159728	1388	56131
Mexico	532	14962	545	19642
Spain	8	471	25	5426
China	125	3344	100	2731
France	3	920	3	1092
Germany	31	1471	20	789
Virgin Is US	40	1350	20	713
Australia	-	-	20	486
Japan	-	-	1	75
Other countries	111	4467	-	-

**Table – 7: Imports of Kieselguhr (By Countries)**

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>20</b>	<b>717</b>	<b>20</b>	<b>804</b>
Netherlands	-	-	20	802
UK	-	-	++	2
Other countries	20	717	-	-

DIATOMITE

**Table – 8: Imports of Tripoli Earth  
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>19</b>	<b>740</b>	-	-
USA	19	740	-	-
Other countries	-	-	-	-

## FUTURE OUTLOOK

The economic stability of diatomite was largely on account of its use as a viable filtration medium. Despite challenging market condition for many industrial commodities, world diatomite production remained stable. The demand for diatomite as filtration medium still remains strong particularly in the filtration of spirit as well as human blood plasma and in other biotechnical applications.

The large world reserves and near stability in demand are certain to keep the viability of diatomite steady in the foreseeable future, especially in the filler and absorbent markets.