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# DIATOMITE

## (FINAL RELEASE)

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# 15 Diatomite

Diatomite is extremely fine grained and highly absorbent due to porosity and has honeycomb like structure. It is also called 'Kieselguhr'. It has a chemical composition $SiO_2$. $nH_2O$ which is similar to opal or hydrous silica. A workable diatomite deposit of significance has not been established in the country. 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 & Trinicutta Islands in Andaman and Nicobar. As per UNFC system, the total resources of diatomite as on 1.4.2010 are estimated at 2.89 million tonnes, all of which fall under remaining resources. The total 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) | |
| **All India: Total** | – | **634** | **2251** | **2885** | **2885** |
| **By Grade** | | | | | |
| Unclassified | – | 634 | 2251 | 2885 | 2885 |
| **By States** | | | | | |
| 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 Khadraliya areas in Bhavnagar district, Gujarat were the producing areas prior to 1991-92.

## USES

Commercial diatomite contains 85-94% $SiO_2$, 1 to 7% $Al_2O_3$, 0.4 to 2.5% $Fe_2O_3$, 0.1 to 0.5% $TiO_2$, 0.03 to 0.2% $P_2O_5$, 0.3 to 3% CaO, 0.3 to 1% MgO, 0.2 to 0.5% $Na_2O$, 0.3 to 0.9% $K_2O$ and 0.1 to 0.2% organic matter and soluble salts.

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 diatom skeletal structure and constitution, low bulk density, soluble impurities, high absorptive capacity for liquids, large surface area, low thermal conductivity, mild abrasive nature and chemical inertness.

The most important use of diatomite is as a filter aid, especially for colloidal or solid solutions like beverage, fruit juice, syrup, oil and antibiotics and for water treatment to remove amoebic cysts and blood-fluke larvae. Life-saving drugs like tetracycline and insulin are filtered through diatomite. The use of diatomite in filtration applications is on the decline as ceramic & polymeric and carbon membrane technologies are increasingly adopted. However, its applications as an absorbent of vegetable oil, polyethylene, rayon liquors and as a flattening agent in paint, plastic, rubber, drugs, toothpaste, polishes and

chemicals are on the rise. Diatomite is utilised for safe handling and storage of hazardous chemicals like sulphuric acid. Besides, diatomite is used as an abrasive in metal polishing in automobiles and toothpastes, pozzolanic admixtures in cement industry and animal feed stuff conditioners and explosives. It is also used as a coating material in the manufacture of ammonium nitrate fertilizer which is hygroscopic. The coating of diatomite keeps the material in granular form. Diatomite clay is the new revolution in hydroponics. In pharmaceuticals, it is used to filter syrups and other bulk drugs in liquid form. In oil industry, before packing it is used to filter oil to give it a shine and to remove any suspended impurity. Beer is filtered through diatomite 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. It is also used as caking agent in fertilizers and pesticides and as filler for paints and plastics. Potable water treatment and biological filteration 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. As filler material, substitutes such as talc, ground silica sand, ground mica, clay, perlite, vermiculite and ground limestone are widely in use. For thermal insulation, various clays and special brick, mineral wool, expanded perlite and exfoliated vermiculite are used.

## WORLD REVIEW

The USA has the largest reserves at 250 million tonnes and China follows with 110 million tonnes (Table -2). The USA also remained the largest consumer and exporter of processed diatomite for filtration use in the world. The world's largest producing district in terms of volume is near Lompoc, CA in USA. These deposits could meet all of the world's current diatomite demand for hundreds of years.

The economic stability of the mineral commodity was largely due to its use as a filtration medium. The total world diatomite production decreased to 2.68 million tonnes in 2011 from 2.83 million tonnes in the previous year. Argentina dominates world production accounting for about 37.31% estimated output followed by USA (22%), China (16%) and Japan (4%). Production in Denmark (3%) was mostly of molar, an impure mixture that includes diatomite. Other important producers of diatomite in 2011 were, Spain and Mexico (3%) each, (Table- 3).

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

(In '000 tonnes)

| Country | Reserves |
|---|---|
| **World: Total (rounded)** | **Large** |
| Argentina | NA |
| China | 110000 |
| Denmark (processed) | NA |
| France | NA |
| Japan | NA |
| Mexico | NA |
| Spain | NA |
| USA | 250000 |
| Other countries | NA |

***Source:*** *Mineral Commodity Summaries, 2013.*

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

(In '000 tonnes)

| Country | 2009 | 2010 | 2011 |
|---|---|---|---|
| **World : Total** | **1561** | **2836** | **2680** |
| Argentina | 62 | 1252 | 1000(e) |
| China(e) | 440 | 400 | 440 |
| Denmark (Molar)* | 83 | 84 | 81 |
| France | 75 | 75 | 75 |
| Japan(e) | 110 | 110 | 110 |
| Mexico | 81 | 92 | 84 |
| Spain@ | 29 | 64 | 84 |
| Commonwealth of Independent States(e) | 80 | 80 | - |
| USA | 575 | 595 | 600 |
| Other countries | 26 | 84 | 206 |

***Source:*** *World Mineral Production, 2007-2011.*
***Note:*** ** Molar is an impure diatomite containing a large proportion of clay ; @Including Tripoli*

# FOREIGN TRADE

Exports of diatomite were 26,886 tonnes in 2011-12 as against 4,647 tonnes in the previous year. Exports were mainly to Saudi Arabia (94%) and UAE (4%). Exports of kieselguhr decreased to12 tonnes in 2011-12 from 52 tonnes in the previous year. Exports were mainly to Ethiopia (92%) and Mauritious (8%). There were no exports of tripoli earth in 2010-11 and 2011-12.

Imports of diatomite were 1,583 tonnes in 2011-12 as against 1,510 tonnes in the previous year. Imports were mainly from USA (77%) and China (5%) followed by Canada (4%).

Imports of kieselguhr were 44 tonnes in 2011-12 compared to 156 tonnes in the previous year. Imports of kieselguhr were solely from Belgium.

Imports of tripoli earth were 42 tonnes in 2011-12 as against 19 tonnes in the previous year. The entire imports of tripoli earth were from USA (Tables 4 - 8).

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

| Country | 2010-11 | | 2011-12 | |
|---|---|---|---|---|
| | Qty (t) | Value (₹'000) | Qty (t) | Value (₹'000) |
| **All Countries** | **4647** | **39672** | **26886** | **230620** |
| Saudi Arabia | 3758 | 31121 | 25221 | 216796 |
| UAE | 47 | 442 | 1152 | 8422 |
| Denmark | 309 | 3416 | 155 | 1631 |
| Sri Lanka | - | - | 101 | 1039 |
| Oman | 33 | 711 | 45 | 861 |
| China | 35 | 364 | 70 | 743 |
| Bangladesh | - | - | 101 | 672 |
| Malaysia | ++ | 23 | 30 | 352 |
| Switzerland | - | - | 11 | 90 |
| Nepal | - | - | ++ | 13 |
| Other countries | 465 | 3595 | ++ | 1 |

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

| Country | 2010-11 | | 2011-12 | |
|---|---|---|---|---|
| | Qty (t) | Value (₹'000) | Qty (t) | Value (₹'000) |
| **All Countries** | **52** | **593** | **12** | **149** |
| Ethiopia | - | - | 11 | 92 |
| Mauritius | 1 | 112 | 1 | 56 |
| Other countries | 51 | 481 | ++ | 1 |

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

| Country | 2010-11 | | 2011-12 | |
|---|---|---|---|---|
| | Qty (t) | Value (₹'000) | Qty (t) | Value (₹'000) |
| **All Countries** | **1510** | **47906** | **1583** | **46753** |
| USA | 1366 | 44421 | 1225 | 35593 |
| Canada | 58 | 1673 | 61 | 2801 |
| China | 50 | 901 | 85 | 2419 |
| Belgium | - | - | 60 | 1965 |
| Mexico | - | - | 32 | 1025 |
| Finland | - | - | 40 | 978 |
| Malaysia | - | - | 40 | 934 |
| Slovak Rep. | - | - | 20 | 595 |
| Chinese Taipei/Taiwan | - | - | 20 | 442 |
| Other countries | 36 | 911 | ++ | 1 |

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

| Country | 2010-11 | | 2011-12 | |
|---|---|---|---|---|
| | Qty (t) | Value (₹'000) | Qty (t) | Value (₹'000) |
| **All Countries** | **156** | **5670** | **44** | **1415** |
| Belgium | 147 | 4845 | 44 | 1415 |
| Other countries | 9 | 825 | - | - |

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

| Country | 2010-11 | | 2011-12 | |
|---|---|---|---|---|
| | Qty (t) | Value (₹'000) | Qty (t) | Value (₹'000) |
| **All Countries** | **19** | **486** | **42** | **593** |
| USA | 19 | 486 | 42 | 593 |

## FUTURE OUTLOOK

Despite challenging market condition for many industrial commodities world diatomite production is stable. The economic stability of the mineral commodity was largely due to its use as a filtration medium,where its demand remains strong particularly in the filtration of spirits as well as human blood plasma and other biotechnical applications.

Owing to the large world reserves and near stability in demand, diatomite will probably remain available for the forseeable future, especially in the filter and absorbent markets.