31 Diatomite

Diatomite is extremely fine grained and highly absorbent. Each particle is porous 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(P)
(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 after calcination is commonly used 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, which is added in tablets, etc. In oil industry, before packing it is used to filter oil to give it a shine and to remove any suspending 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 fillers 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 world reserves of crude diatomite are large to meet the market demands. The USA has the largest reserves at 250 million tonnes (Table-2). The USA also remained the largest producer, consumer and exporter of processed diatomite for filtration use in the world.

The total world diatomite production decreased to 1.99 million tonnes in 2009 from 2.03 million tonnes in the previous year. The USA continued to dominate world production accounting for about 40% output followed by China (22%). Production in Denmark (8%) was mostly of molar, an impure mixture that includes diatomite. Other important producers of diatomite in 2009 were , Japan (6%), Commonwealth of Independent States and Mexico (4% each) (Table - 3).

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

(In '000 tonnes)

Country	Reserves
World : Total (rounded)	**Large**
China	110000
Commonwealth of Independent States	NA
Czech Republic	4100
Denmark	NA
France	NA
Japan	NA
Mexico	NA
Peru	2000
Spain	NA
USA	250000
Other countries	550000

Source: *Mineral Commodity Summaries, 2010.*

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

(In '000 tonnes)

Country	2007	2008	2009
World : Total	**1906**	**2033**	**1994**
China [e]	420	440	440
Denmark (Molar)*	201	210	168
France [e]	75	75	75
Japan [e]	120	115	115
Mexico	83	129	81
Spain #	45	46	45[e]
USA	687	764	790[e]
Commonwealth of Independent States [e]	80	80	80
Other countries	195	174	200

Source: *World Mineral Production, 2005-2009.*
Note: ** Molar is an impure diatomite containing a large proportion of clay.*
 # Including Tripoli.

FOREIGN TRADE

Exports of diatomite were 1,146 tonnes in 2009-10 as against 725 tonnes in the previous year. Exports were mainly to Denmark and Saudi Arabia. Exports of Kieselguhr increased to 123 tonnes in 2009-10 from 4 tonnes in the previous year. Exports were mainly to Chinese Taipei/Taiwan. There were no exports of tripoli earth in 2009-10 (Tables - 4 to 6).

Imports of diatomite decreased to 1,584 tonnes in 2009-10 from 1,817 tonnes in the previous year. Imports were mainly from USA. Imports of kieselguhr were 195 tonnes in 2009-10 and 176 tonnes in the previous year. Imports of kieselguhr were mainly from Belgium. Imports of tripoli earth were 39 tonnes in 2009-10 and 21 tonnes in the previous year, all from USA. (Tables - 7 to 9).

Table – 4 : Exports of Diatomite (By Countries)

Country	2008-09		2009-10	
	Qty (t)	Value (Rs.'000)	Qty (t)	Value (Rs.'000)
All Countries	**725**	**4974**	**1146**	**11025**
Denmark	308	2767	771	7487
Saudi Arabia	52	507	249	2124
Oman	–	–	18	387
China	350	1569	36	374
Chinese Taipei/ Taiwan	–	–	48	362
Israel	–	–	20	240
Nepal	–	–	4	50
Sri Lanka	15	131	–	–
Other countries	–	–	++	1

Table – 5 : Exports of Kieselguhr (By Countries)

Country	2008-09		2009-10	
	Qty (t)	Value (Rs.'000)	Qty (t)	Value (Rs.'000)
All Countries	**4**	**43**	**123**	**1017**
Chinese Taipei/ Taiwan	–	–	120	923
Maritius	1	25	2	89
Iraq	–	–	1	5
Nepal	3	18	–	–

Table – 6 : Exports of Tripoli Earth (By Countries)

Country	2008-09		2009-10	
	Qty (t)	Value (Rs.'000)	Qty (t)	Value (Rs.'000)
All Countries	**25**	**391**	**–**	**–**
Spain	25	391	–	–

Table – 7 : Imports of Diatomite (By Countries)

Country	2008-09		2009-10	
	Qty (t)	Value (Rs.'000)	Qty (t)	Value (Rs.'000)
All Countries	**1817**	**48615**	**1584**	**46387**
USA	1634	43638	1494	44358
China	32	863	70	1451
Canada	140	3407	20	486
Korea, Rep. of	++	6	++	91
France	5	104	–	–
Thailand	6	597	–	–
Other countries	–	–	++	1

Table – 8: Imports of Kieselguhr
(By Countries)

Country	2008-09		2009-10	
	Qty (t)	Value (Rs.'000)	Qty (t)	Value (Rs.'000)
All Countries	**176**	**9685**	**195**	**6337**
Belgium	133	5597	174	5796
Spain	–	–	12	309
China	38	3859	8	206
Czech Republic	5	227	1	26
Germany	++	2	–	–

Table – 9 : Imports of Tripoli Earth
(By Countries)

Country	2008-09		2009-10	
	Qty (t)	Value (Rs.'000)	Qty (t)	Value (Rs.'000)
All Countries	**21**	**471**	**39**	**930**
USA	21	471	39	930