

POTASH



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POTASH

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**GOVERNMENT OF INDIA
MINISTRY OF MINES
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Potash is a common name of the fertilizer form of mineral potassium (K) which is abundantly available in nature. The name derives from the collection of wood ash in metal pots when the beneficial fertilizer properties of this material were first recognised many centuries ago. Potassium can be applied as a straight fertilizer, or as part of a blended or compound fertilizer with nitrogen and phosphorus. There are four common kinds of straight potash fertilizer - Muriate of Potash (MOP), Sulphate of Potash (SOP), Potassium Magnesium Sulphate and Potassium Nitrate.

Bedded marine evaporite deposits and surface & sub-surface potash-rich brines are principal sources of potash. The principal ore is sylvinite, a mixture of sylvite (KCl) and rock salt (NaCl). As far as India is concerned, few deposits of potash mineral are reported from Satna & Sidhi districts of Madhya Pradesh, Sonbhadra district of Uttar Pradesh and Jaisalmer, Chittorgarh and Kota districts of Rajasthan. It is in the form of Glauconitic (a potassium bearing green mica) sandstone. However, Indian reported occurrences are not commercially exploitable and hence no production of potash is reported from India. The entire requirement of potash to be utilised as fertilizer is therefore met by imports.

RESOURCES

As per UNFC system, the total resources of potash as on 1.4.2010 are estimated at 21,815 million tonnes in the country all in remaining resource category. Rajasthan alone contributes 94% to the total resources, followed by Madhya Pradesh (5%) and Uttar Pradesh (1%) (Table- 1).

EXPLORATION AND DEVELOPMENT

GSI carried out exploration for glauconite/potash in Gujarat, Madhya Pradesh and Uttar Pradesh. The details of exploration carried out during 2014-15 are given in Table-2.

OCCURRENCES

Glauconitic sandstones/greensands deposits can be used as an alternative indigenous resource for potash. Glauconite is essentially a complex hydrous silicate of iron and potassium chiefly with ferric oxide and partly with ferrous oxide. It contains about 4-7% K₂O.

In India, glauconite is commonly associated with sand/sandstones, shale, marl and occasionally with limestone. Glauconitic sandstones of Vindhyan Group represent oldest glauconite deposits which are well developed in Son Valley region covering parts of Madhya Pradesh and Uttar Pradesh. In Madhya Pradesh, occurrences are in Sidhi and Satna districts. The deposit of same origin are located in Banda, Sonbhadra and Mirzapur districts of Uttar Pradesh. Glauconite occurs in shale, limestone and Tal formations at Duggad and Tal Valley in Garhwal and Mussoorie in Dehradun district, Uttarakhand. In Rajasthan, glauconitic sandstones/shales occur in Chittorgarh, Kota, Karauli, Jaisalmer and Barmer districts. In Gujarat, glauconite is found in Ukra Formation at Guneri in Kachchh district. In Himachal Pradesh, glauconite of hydrothermal origin is found in Kumla-Kathwar area of Sirmaur district. In Kerala, glauconite occurs in Quilon Limestone and sea bed sediments of Thiruvananthapuram coast.

USES

Potash is an essential nutrient for protein synthesis and it aids plants to use water more efficiently. Glauconitic sandstones/greensands are used directly in acidic soils in eco-friendly manner, as glauconitic sand mixes homogeneously with the soil and provides potash as nutrients for plants. It also increases soil fertility and improves soil texture, porosity and permeability due to more or less uniform grain size. Potassium chloride (KCl) is the principal fertilizer product with 60-62% of K₂O equivalent. Other salts, for fertilizer use, are potassium sulphate, potassium magnesium sulphate and potassium nitrate. Potassium chloride and potassium nitrate are used in manufacture of glass, ceramics, soap, synthetic rubber and chemicals. Potassium nitrate is used in explosive manufacture. Potash is also used as a raw material for manufacturing complex fertilizers.

CONSUMPTION

Domestic consumption of potash was about 1.35 million tonnes in 2014-15 and the fertilizer Industry solely accounting for its entire consumption, showed a slight increase from that of the previous year (Table- 3).

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

(In million tonnes)

Grade/State	Reserves Total (A)	Remaining Resources			Total Resources (A+B)	
		Indicated STD332	Inferred STD333	Reconnaissance STD334		
All India : Total	–	18142	3652	22	21815	
By Grades						
Glauconite	–	878	1068	22	1968	1968
Polyhalite	–	13985	2179	–	16164	16164
Sylvite	–	2072	404	–	2477	2477
Unclassified	–	1206	–	–	1206	1206
By States						
Madhya Pradesh	–	1206	–	–	1206	1206
Rajasthan	–	16936	3462	22	20419	20419
Uttar Pradesh	–	–	190	–	190	190

Figures rounded off.

Table – 2 : Details of Exploration Activities for Potash, 2014-15

Agency/ State/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
GSI							
GLAUCONITE							
Gujarat							
Kachchh	Guneri village	1:5000	7.5	-	-	184	Detailed Investigation for potash in glauconite bearing shale and sandstone was carried out. The area was divided into 114 grids of 250 m × 250 m and sampling was carried out by pitting and from exposed sections. Pitting of 150 cu m was carried in grid pattern. A total of 151 samples were collected and sent for chemical analysis. 24 samples were collected for petrographic studies and 09 samples were collected for XRD studies. Section measurements were carried out at 5 sections. Glauconite is fine to medium grained, very light to dark green and occurs as small discontinuous bands within ferruginous sandstone. Occurrences of other economic minerals like gypsum, bauxite and bentonite as small veins/pockets/patches were observed around Guneri and Umarsar areas. Glauconite occurs as three different forms in the

(Contd.)

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Table – 2 (Concl.)

Agency/ State/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
Guneri village (Contd.)							study area; viz; hard and compact glauconitic sandstone, sandy to clayey soft glauconite, and intercalation of glauconite with fine grained ferruginous sandstone/siltstone. The bands are discontinuous, average thickness varies from few cm to 0.5 m. Based on the observation from pits and well sections, glauconite occurred at 0 to 4 m depth.
Madhya Pradesh							
Sidhi	-	G-4 stage -	-	-	-	12	A G4 stage investigation for glauconitic shale/ sandstone was taken up in Vindhyan Supergroup. Based on field observations three types of association of glauconite beds have been recorded. The analytical results of the samples indicate that glauconitic shale associated with Fawn limestone is the potential host of glauconite. Analytical results of 12 samples give K ₂ O content between 3.85% -11.52 percent.
Uttar Pradesh							
Sonbhadra	Newari-Semiyan area	G-4 - stage	-	-	802.35	40	A G4 stage investigation was carried out by LSM, detailed mapping and scout drilling. Study of drilled cores together with borehole geophysical data of Semiyan block reveals glauconite mineralisation is occurring at three different levels in depth. 1.33 million tonnes of resources were estimated on the basis of data of boreholes NSH-1, 2 & 3 in Semiyan block with an average grade of K ₂ O - 4.86%. Glauconite bearing zone with a strike length of 650 m and average width of 30-50 m was delineated in the Barawadih area. Analytical results of 40 nos. bed rock samples of Barawadih area show K ₂ O value ranges from 0.61% to 6.56 % with an average value of 4.31%. Analytical results of some spot samples of Kurccha block show maximum value for K ₂ O is 11.09 percent.

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**Table – 3: Consumption* of Potash Salt
2012-13 to 2014-15
(By Industries)**

Industry	(In tonnes)		
	2012-13	2013-14 (P)	2014-15 (P)
All Industries	1316200	1310800	1349500
Fertilizer	1316200(11)	1310800(11)	1349500(11)

Figures rounded off

Figures in parentheses denote the number of units in organised sector.

(*Paucity of data, hence coverage may not be complete).

WORLD REVIEW

The world reserves are estimated at approximately 3,700 million tonnes of K₂O content. Deposits are located mainly in Canada (27%), Belarus (20%), Russia (16%), Israel & Jordan (7% each), China (6%) and Chile & Germany (4% each) (Table-4).

The world production of potash in 2014 was 39.1 million tonnes in terms of K₂O content as against 34.1 million tonnes in 2013. Canada remained the leading producer of potash with 29% share in total production in 2014, followed by Russia (19%), Belarus (16%), China (9%), Germany (8%), Israel (6%), Chile & Jordan (3% each) (Table-5).

**Table – 4: World Reserves of Potash
(By Principal Countries)**

Country	(In '000 tonnes of K ₂ O content)
Country	Reserves
World: Total (rounded)	3700000
Belarus	750000
Brazil	13000
Canada	1000000
Chile	150000
China	210000
Germany	150000
Israel	270000
Jordan	270000
Russia	600000
Spain	20000
UK	70000
USA	120000
Other countries	90000

Source: Mineral Commodity Summaries, 2016.

**Table – 5: World Production of Potash
(By Principal Countries)**

Country	(In '000 tonnes of K ₂ O content)		
	2012	2013	2014
World: Total	31478	34161	39099
Belarus	4831	4179	6340
Canada (Chloride)	8963	10140	11345
Chile (Chloride)	996	1158	1108
China	2559	3600	3600 ^(e)
Germany (Potassic salt)	3149	3075	3127
Israel (Chloride)	2115	2155	2213
Jordan	1094	1047	1100
Russia (Chloride)	5563	6104	7402
USA (Potassic salt)	900	960	850
Other countries	1308	1743	2014

Source: World Mineral Production, 2010-2014.

FOREIGN TRADE

Exports

Exports of potash fertilizer increased considerably to 39,052 tonnes in 2014-15 as against 19,753 tonnes in the previous year. Exports were mainly to Sri Lanka (53%), UAE (14%), Pakistan (9%) and Mozambique (5%), Exports of potassium nitrate decreased slightly to 1,133 tonnes in 2014-15 from 1,144 tonnes in the previous year. Exports were mainly to Thailand (41%), Bangladesh (16%), USA (13%) and Egypt (10%) (Tables- 6 and 7).

Imports

Imports of potash fertilizer increased drastically to 4.62 million tonnes in 2014-15 from 3.39 million tonnes in the previous year. Russia (28%), Canada (25%), Israel (14%), Belarus (10%) and Jordan (8%), were the main suppliers in 2014-15. On the other hand imports of potassium nitrate increased drastically to 181 tonnes in 2014-15 from 96 tonnes in the previous year. China (71%) and Korea, Rep. of (28%) were the main suppliers of potassium nitrate in 2014-15 (Tables- 8 and 9).

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**Table – 6 : Exports of Potash Fertilizers
(By Countries)**

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	19753	649845	39052	1122425
Sri Lanka	9459	248506	20524	404528
UAE	3793	140559	5643	190294
Pakistan	489	19163	3705	118821
Brazil	-	-	1800	80630
Mozambique	1736	58076	1848	78942
Egypt	292	9537	1180	50702
Korea, Rep. of	552	21009	600	25549
Saudi Arabia	139	4895	572	24850
Peru	600	22803	550	23080
Iran	988	47388	561	22813
Other countries	1705	77909	2069	102216

**Table – 7: Exports of Potassium Nitrate
(By Countries)**

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	1144	92206	1133	169325
Thailand	412	32070	470	65182
USA	29	6222	142	43691
Egypt	-	-	118	14607
China	34	6797	67	12786
Bangladesh	49	2815	182	10796
South Africa	18	5178	29	8521
Yemen Republic	75	4084	75	4123
UAE	117	7407	15	2509
Bahrain	++	2	5	2035
Indonesia	++	27	10	1907
Other countries	410	27604	20	3168

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**Table – 8: Imports of Potash Fertilizers
(By Countries)**

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	3394833	81826455	4620668	92745062
Russia	898673	21447423	1275123	24710551
Canada	828718	20070241	1145382	22538185
Israel	576773	13786229	658061	12994608
Belarus	280412	6681302	456711	8908105
Jordan	352043	8706090	346880	7780427
Lithuania	92985	2180279	277715	5324208
Germany	153293	3791005	180626	4585504
China	2432	88406	100953	1916475
Indonesia	3206	117466	87317	1809835
Latvia	181983	4186537	33000	620673
Other countries	24315	771477	58900	1556491

**Table – 9: Imports of Potassium Nitrate
(By Countries)**

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	96	17545	181	21516
Korea, Rep. of	20	2324	50	10611
China	50	5126	129	9500
Austria	1	5540	1	589
Germany	1	1828	1	285
USA	1	87	++	276
Netherlands	1	660	++	236
UK	-	-	++	14
Belgium	-	-	++	5
Other countries	22	1980	-	-