Zeolitic Tuff

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Zeolites are natural volcanic minerals that are mined in certain parts of the world. When volcanoes erupt, molten lava and thick ash pour out. Because many volcanoes are located on an island or near an ocean, this lava and ash often flows into the sea. Zeolite occurs as a cementing material to volcanic **tuff** granules.

Zeolites are an extremely useful group of minerals characterized by a microporous structure — that is, a structure with minute pores. Chemically, they are alumino-silicate minerals that can lose and absorb water and various ions and gases without damage to their crystal structures. The cations in their pores are generally those of alkali metals (such as Na^+ and K^+) or alkaline earth metals (such as Ca^{2+} or Mg^{2+}). These positive ions are loosely held and can be readily exchanged for others in a contact solution.

About 48 naturally occurring zeolites are known, and more than 150 types have been artificially synthesized. Some of the common mineral zeolites are analcime, chabazite, heulandite, natrolite, phillipsite, and stilbite.

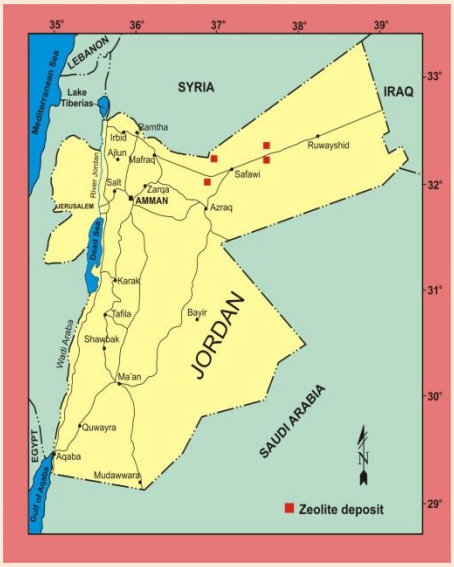
Application of Natural Zeolite

- Filler in the paper industry.
- Light weight aggregate in construction.
- In pozzolanic cement and concrete.
- Odor control (animals).
- Ion – Exchange in the purification of water and municipal sewage effluent.
- Traps for radioactive species in law level waste waters from nuclear facilities.
- In the production of high purity oxygen from air.

- Reforming petroleum catalysis.
- Acid resistant absorbent in the drying and purification of natural gas.
- Applying zeolite to the soil can improve its ability to hold nutrient and water.

Zeolite (Zeolitic Tuff) In Jordan

Locations



The North Arabian Plateau Basalt covers an area of about 11,000 km^2 in northeast of Jordan and extends northwest into Syria and southeast into Saudi Arabia.

Phillipsite, chabazite and faujasite are the most abundant zeolite minerals found in the Jordanian zeolitic tuff. The zeolite content in these tuffs varies from (20% to 65%). Using simple mineral processing routes, zeolite concentrates with grades up to 90% were achieved.

Zeolitic tuffs are located in Jabal Aritayn (30km northeast of Azraq), Tlul Al-Shahba (20 km east of Al Safawi), Tal Al-Rimah (35 km northeast of Al Mafraq) and other small deposits in central and south Jordan.

Reserves

Area	**Geological Reserves (mt)**
Tal Al-Rimah	46
Al-Aritayn	170
Tlul Al-Shahba	9.2

Chemical Properties

Area	SiO_2 %	Al_2O_3 %	Fe_2O_3 %	MgO%	CaO%	K_2O%	Na_2O%
Exploited							
Tal-Al Rimah	42.0	12.8	12.1	10.1	8.5	0.8	4.0
Al Aritayn	38.6	12.8	12.1	9.6	9.3	1.5	2.1
Mukawer	42.7	13.9	12.7	9.2	9.8	1.9	2.1
Not exploited							
Shihan	44.0	13.2	8.3	8.6	11.3	1.2	2.0
Tal Juhayra	35.0	10.2	11.3	7.6	20.2	0.7	2.4
Jabal Ata'atah	48.0	10.8	8.1	7.7	10.1	0.5	1.5
Tlul Al-Shahba	41.7	11.8	12.0	10.3	9.4	1.7	2.8
Jabal Unaizah	40.0	7.9	8.8	8.6	15.8	0.9	5.7

Investment Opportunities

Cement Industry

Zeolitic tuff production in Jordan started in 1998, and therefore it is a relatively new sector. Currently, zeolitic tuff consumed by Jordan Cement factories to produce pozzolanic cement.

Lightweight Concrete

Volcanic tuff and scoria are the main source for lightweight aggregates. These materials are suitable for producing lightweight concrete which could be used in many structural aspects. Due to the huge reserves of tuff materials, Jordan is considered as an excellent source for such aggregates.

Agriculture Applications

Given the size of the agricultural sector in the region, it is estimated that the market potential in these application is large. In terms of Jordan's cultivated land, each two percent increase in land treated with zeolitic tuff would result in an increase in zeolitic tuff demand of 100,000 tons per annum and 50,000 tons per annum in animal feed and odor control. The total expected demand potential is 360,000 ton per annum depending on previous assumptions. Also it can be used in animal waste treatment and / or as air purification media inside animal houses. It would reduce the odor intensity and ammonia gas concentration within the building, therefore, reduce the air ventilation needs, consequently, reduce the energy consumption. And at the same time creates enhanced conditions for animals to live and for labor to work.

Wastewater Treatment

Zeolitic tuff could be used successfully in removing Cu+2, Cr+3, Ni+2, Pb+2 and Zn+2 from industrial wastewater.

Note: For More Information and inquiry can be contacted at the following address:

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