

Zeolite in Yemen



Natrolite crystal.

Natural zeolite of good quality has been found in several areas of Yemen.

Geological setting

Natural zeolite occurs in altered volcanic tuffs. Parts of Yemen have experienced violent and long-lasting volcanic activity which has covered large areas (>60,000 km²) with volcanic ashes. These fields provide excellent targets for zeolite exploration and exploitation.

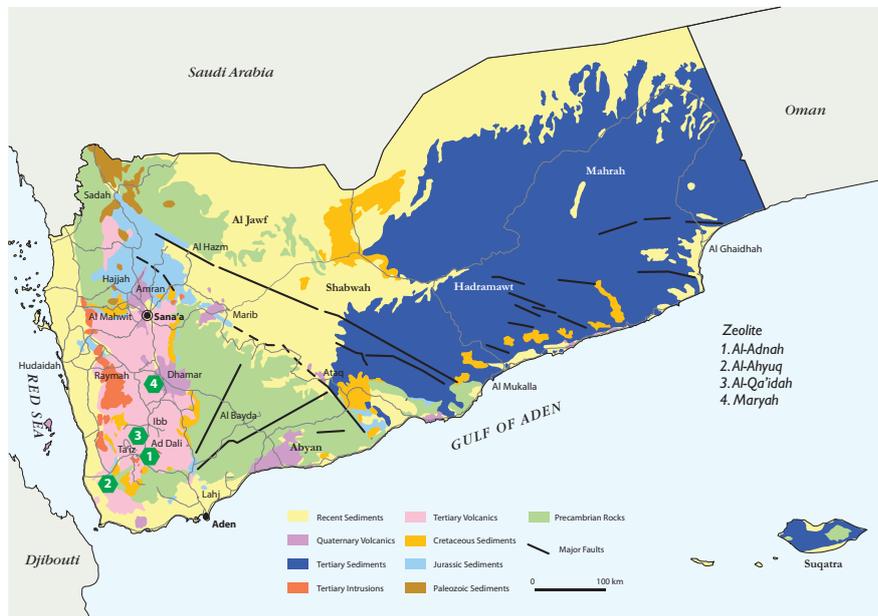
Zeolitic tuff deposits are found in three governorates: Ta'iz, Ibb and Dhamar, and they appear to be holding interesting resources. The deposits are characterised by white, grey, green and yellowish colours with fine-grained textures. Pumice and perlite fragments are often present within the zeolitic tuffs. The zeolite was presumably formed by hydrothermal alteration of volcanic glass in the tuffaceous rocks.

Zeolite in Ta'iz

The natural zeolite deposits in the Ta'iz governorate are found mainly in two areas (Al-Adnah and Al-Ahyuq). The zeolite minerals occur in volcanic tuffs with purities ranging from 58 to 100% zeolite. The different kinds of natural zeolite minerals are clinoptilolite, heulandite and mordenite with rare stilbite.

The Al-Adnah area

The zeolitic tuff is situated about 8 km east of Ta'iz city. In this area there is an accumulation of white, green, yellowish tuff, partly friable towards the surface. The zeolitic tuff occurs in decimetre thick layers dipping to the north-west.



Geological sketch map of Yemen with the most promising zeolite occurrences.



Outcrop of zeolite tuff deposit in Al Qubbah-Ibb. Hammer for scale.

Chemically, the zeolitic tuffs at Al-Adnah contain 67.75–73.19% SiO₂, 10.37–13.18% Al₂O₃, 2.06–4.89% K₂O, 2.01–4.60% Fe₂O₃, 0.53–2.58% CaO and 0.01–1.94% Na₂O. The percentages of zeolite minerals (heulandite & clinoptilolite) vary from 60 to 75%. The reserves of zeolitic tuffs are estimated to be about 53 million m³.

The Al-Ahyuq area

A high-quality zeolite mineral deposit is located about 90 km south-west of Ta'iz city. The zeolite minerals are found in Tertiary volcanic tuffs (Yemen Trap Series). In large areas, a tuffaceous complex is found with beds from 12 to 90 m thick. They are white-yellowish, grey or green-

yellowish in colour. The zeolite contents in the volcanic tuffs range from 68 to 100%. The different kinds of natural zeolite minerals are clinoptilolite, heulandite and mordenite with rare stilbite and laomonotite.

The composition of zeolitic tuffs at Al-Ahyuq contain 61.01–72.00% SiO₂, 10.96–14.41% Al₂O₃, 1.12–7.41% K₂O, 0.74–3.68% Fe₂O₃, 0.47–3.53% CaO and 0.47–3.53% Na₂O. The amount of zeolite varies from 33–72% clinoptilolite, 24–50% mordenite, 27–42% heulandite & 10–28% stilbite. The total reserves of zeolitic tuff are 86 million m³.

Zeolite in Ibb

The natural zeolite deposits in the Ibb governorate are found mainly in Al-Qa'idah area. The zeolite content of these tuffaceous rocks range from 58 to 97%. They are mostly composed of clinoptilolite and heulandite. In some area the zeolites (natrolite and stilbite) are found as radial crystals within cracks and voids within agglomerates.



Zeolite deposits in Al-Adnah, Ta'iz.

The Al-Qa'idah area

The zeolitic tuff is situated about 5 to 12 km west of the locality of Al-Qa'idah. It is a stratiform deposit of white-grey to light green 25-30 m thick zeolitic tuff. In this area the zeolitic tuffs are covered by red tuffs or rhyolite. Zeolitic tuff occurs east of Al- Qa'idah, but with small thickness only.

Chemically, the zeolitic tuffs at Al-Qa'idah contain 58.96-75.72% SiO₂, 9.74-15.45% Al₂O₃, 1.24-6.66% K₂O, 1.58-5.82% Fe₂O₃, 0.49-2.59% CaO and 0.26-2.01% Na₂O.

The percentage of zeolites varies from 33 to 92% clinoptilolite, 17 to 41% mordenite & 17 to 25% stilbite. The total reserves of zeolitic tuff are 37 million m³.

Zeolite in Dhamar

The natural zeolite deposits in Dhamar governorate are found mainly in the Maryah area. The zeolite minerals occur

in volcanic tuffs with purity ranging from 68 to 72% zeolites. The different kinds of natural zeolite minerals are clinoptilolite, heulandite and mordenite with rarely stilbite and laomonotite.

The Maryah area

The zeolitic tuff is situated about 16 km west of Dhamar town. The hills of zeolitic tuffs and ashes are of a light yellow colour and are covered by rhyolites and ignimbrites. The zeolitic tuff and ash contain fragments of pumice.

Chemically, the zeolitic tuffs at Maryah contain 51.00-63.02% SiO₂, 10.37-13.18% Al₂O₃, 2.06-4.89% K₂O, 5.45-9.27% Fe₂O₃, 0.78-3.47% CaO and 0.76-2.60% Na₂O. The zeolitic tuff is mostly composed of two zeolite minerals - mordenite (39.4%) and clinoptilolite (30%). The reserves of zeolitic tuffs are estimated to be about 9 million m³.



Ministry of Oil & Minerals
Yemen Geological Survey
and Mineral Resources Board

Dear Investors

We take this opportunity to welcome you to Yemen.

We promise to make every possible effort to give you all required information in the mineral sector in Yemen.

If you face any problems or need any assistance, please don't hesitate to contact us on the following address:

P.O. Box 297
Sana'a - Yemen

Tel.: (00967) 1 211 818
Fax.: (00967) 1 217 575

ygsmrb@ygsmrb.org.ye
www.ygsmrb.org.ye

We are looking forward to your mining investments in Yemen.

*Evaluation & Promotion
General Department*

Editing and graphics production:
GEUS

Printed:

January 2009

Printers:

Schultz Grafisk