

Perlite and pumice in Yemen

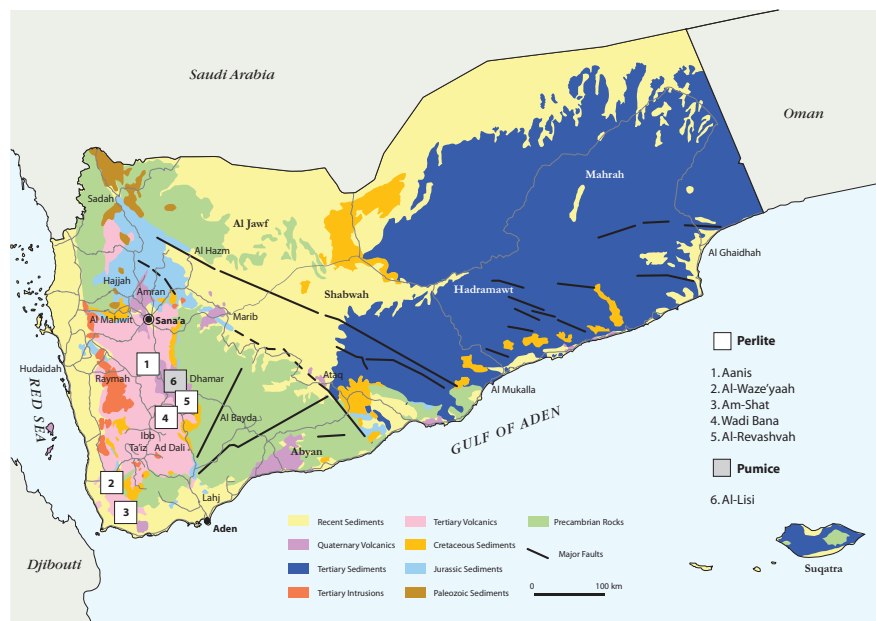
Perlite and pumice deposits are common in the Cenozoic volcanics of Yemen. The porosity and low density of these rocks make them useful in the production of light-weight concrete blocks. They are widespread in various areas, among others Dhamar, Ta'iz and Ibb.

Geological setting

Volcanic glass associated with rhyolite and volcanic tuff is found as massive, columnar beds and dykes or as sills within the Yemen volcanic rocks from the Tertiary and Quaternary periods (Yemen Volcanic Group). Perlitic rocks are found as flows with thicknesses ranging from a few to tens of metres; they are commonly characterised by vitrophyric structures and compact and perlitic textures. The flows are frequently found in the entire region. Pumice shows as thin beds within volcanic ash beds (pumicite) or as blocks mixed with ash.

Perlite

Rapid cooling of acid fluid lavas at the surface resulted in some stratiform deposits of volcanic glass (perlite) in the Dhamar, Ibb and Ta'iz areas; they show as flows with thicknesses ranging from a few to tens of metres. Volcanic glasses, the chemical composition of which corresponds to rhyolite, are black or deep green-grey in colour and as a rule contain feldspar phenocrysts 2–6 mm in size. They crop out as a kind of dome-shaped extrusive bodies. The jointing of the rock is mostly prismatic; thinner layers of the rock are disintegrated to small fragments. Dome-shaped volcanic bodies, usually groups of bodies, create ridges up to several kilometres long and up to 2 km wide. Flows of volcanic glass in their vicinity reach thicknesses of tens of metres. Layers of ignimbrites usually reach thicknesses from 0.5 m up to 1 m, rarely more than 2 m.



Geological sketch map of Yemen, showing locations of perlite and pumice occurrences.



Part of a thick bed of perlite.

The degree of expansion ability must be greater than 4. The expansion ability ratios express the ratio of the sample volume after expansion to the sample volume before expansion. The poor expansion ability of the samples studied is likely to result from the low content of

the gas phase in the moment of creation of the pyroplastic state of the acidic melt at a temperature of 1050°C.

The Aanis area

The perlite deposit is situated about 45 km north-west of Dhamar city. Between

Dhuran and Bayt Al-Umaisy there is a 2500 m high plateau formed of massive perlite, sometimes as 10–100 m thick columns. The deposit is 2 km long and 1 km wide and is found at the surface, without being covered by any rock types. Petrographically and mineralogically, the rocks are formed of perlite with vitrophyric structures and compact, perlitic textures with perlitic separations. Within the rock mass some flow lines can be noticed, sometimes interrupted by small spherulites; small amounts of feldspar and very rarely pyroxene also appear.

Chemically, the perlitic rocks contain 67.57–71.76% SiO_2 , 11.02–11.73% Al_2O_3 , 2.64–2.05% Fe_2O_3 , 4.64–1.53% Na_2O and 4.82–10.45 LOI. The density after expansion ranges between 21.30 and 28.20 lb/ft³. The reserves of perlite are estimated to be about 36 million m³.

The Al-Waze'yaah area

The perlite deposit is situated about 65 km south-west of Ta'iz city. The perlite occurs as medium plateaus, sometimes columnar, with thicknesses ranging from 17 to 76 m.

The deposit covers 339 m² and is found at the surface, without being covered by any rock types. Petrographically, the rocks are formed of perlite with vitrophyric structures, and compact and perlitic textures with perlitic separations. Within the rock mass some flow lines can be noticed, sometimes interrupted by small spherulites; small amounts of feldspar and very rarely pyroxene also appear.

Chemically, the perlitic rocks contain 72.20–73.80% SiO_2 , 11.47–12.04% Al_2O_3 , 2.70–2.80% Fe_2O_3 , 2.11–2.49% Na_2O and 2.21–3.33 LOI. The density after expansion

ranges between 31.18 and 34.90 lb/ft³. The reserves of perlite are estimated to be about 13 million m³.

The Am-Shat area

The perlite deposit is situated about 300 km north-west of Aden city.

During field work, acid volcanic glasses were discovered as one of the products of acidic volcanism of the Ad Dali series. They were tentatively sampled and analysed as potential resources of 'expanded perlite'.

Pumice

Extensive deposits of pale-grey pumice and pumicite occur on the plains east of Dhamar. They are mined from pits by using front-end loaders.

The Al-Lisi area

The pumice deposits are situated about 8 km east of Ta'iz city. Between the village Waraka and the volcano Jabal Lisi and between Garasha and Jabal Sibil a 2 × 4 km area has been identified which exhibits a layer of pumice and fragments of pumice with thicknesses of 2–10 m and which is covered by a thin layer of soil. Pumice deposits are also found near Al-Lisi in the Samah area. Between Samhe and Al-Ghula at about 2.5 km south of the Dhamar-Rida road, a 6 × 0.4 km area exhibits stratiform deposits of volcanic ash, pumice and lapilli of Quaternary age. The deposits are 2–4 m thick and covered by a thin layer of soil.

Chemically, the pumice contains 58.40–74.21% SiO_2 , 7.95–12.50% Al_2O_3 , 3.23–4.72% K_2O , 1.84–5.00% Fe_2O_3 , 0.01–7.81% CaO and 3.62–7.06% Na_2O . The total reserve of pumice is estimated at 1 billion m³.



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