



BSI Standards Publication

Natural stone – Terminology

National foreword

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Natural stone - Terminology

Pierre naturelle - Terminologie

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European foreword

This document (EN 12670:2019) has been prepared by Technical Committee CEN/TC 246 “Natural stones”, the secretariat of which is held by UNI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2019, and conflicting national standards shall be withdrawn at the latest by December 2019.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 12670:2001.

In comparison with the previous edition, the following changes have been made:

— the changes concern essentially the proper scientific definitions, terminology, and diagrams.

This document is one of a series of standards for natural stone products including denomination, test methods and product standards.

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Introduction

The term Natural Stone groups several rock types with marked geological differences. The extraction, elaboration and commerce of Natural Stone have set a very particular vocabulary. Many of these terms have been taken from the popular or quarrymen language, which sometimes is far from scientific definitions. This document establishes the terminological bases for geological and petrologic definitions of Natural Stone and its classification. References to definitions of natural stone products, defined in other European Standards, are provided when necessary. It also incorporates most of the popular or commercial terminology.

The terminology covers the fields of geology, mining, processing, marketing and products of Natural Stone. The included scientific classifications allow setting the scientific name of the stone varieties. If the stone variety is not included in this document, the rock should be classified using its three main mineralogical components.

1 Scope

This document defines the recommended terminology covering scientific and technical terms, test methods, products, and the classification of Natural Stones. This document does not cover roofing slate, for roofing slate see EN 12326-1 and EN 12326-2.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 12326-1, *Slate and stone for discontinuous roofing and external cladding - Part 1: Specifications for slate and carbonate slate*

EN 12326-2, *Slate and stone for discontinuous roofing and external cladding - Part 2: Methods of test for slate and carbonate slate*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1 Geological terms

3.1.1

accessory minerals

rock forming minerals that occur in such small amounts that they are not relevant in the classification or nomenclature of the rock

3.1.2

acid rock

igneous rock that contains more than 66 % vol. of silica

3.1.3

actinolite

Ca-Mg-Fe-amphibole (see amphibole formula)

3.1.4

agate

distinctly banded variety of chalcedony

3.1.5

age

fourth order geological time unit

Note 1 to entry: See Table 2.

3.1.6

agglomerate

pyroclastic rock in which bombs (with diameters greater than 64 mm) > 75 % vol.

3.1.7

agglutinate

welded splatter, commonly of basaltic composition, deposited ballistically in strombolian or fire fountain volcanic eruptions

3.1.8

alabaster

fine grained, compact variety of gypsum, usually white or pale coloured and translucent

3.1.9

albite

sodium plagioclase, formula $\text{Na}(\text{AlSi}_3\text{O}_8)$ (see plagioclase)

3.1.10

alkali feldspar

alkali rich feldspars microcline, orthoclase, sanidine, albite, with less than 5 % vol. anorthite

Note 1 to entry: See feldspar and plagioclase.

3.1.11

allochems

coarser framework grains in most mechanically deposited limestones in the basin of sedimentation

Note 1 to entry: Allochems include: intraclasts, ooids, skeletal particles, pellets (including peloids).

3.1.12

allotriomorphic

anhedral

xenomorphic

mineral which shows in thin sections no characteristic or rational faces, suggested by its crystalline structure

3.1.13

alteration

post-formational change of the mineralogical and or chemical composition of a rock brought about by physical, chemical, or biological means, including actions of hydrothermal solutions and weathering processes, excluding metasomatic and metamorphic changes

3.1.14

alumina

Al_2O_3

chemical compound used in fine polishing

3.1.15

amorphous

phase that does not have a crystalline structure

3.1.16**amphibole**

family of dark ferromagnesian silicate minerals, general formula $A_{2-3}B_5(\text{Si,Al})_8\text{O}_{22}(\text{OH})_2$, where A = Mg, Fe^{2+} , Ca, Na; B = Mg, Fe^{2+} , Fe^{3+} , Al

3.1.17**amphibolite**

gneissose or granofelsic metamorphic rock mainly consisting of green, brown, or black amphibole and plagioclase

Note 1 to entry: A gneissose/granofelsic mesostructure is typical of true amphibolites, in contrast with schistose, green amphibole-albite greenschists.

3.1.18**amygdaloidal**

texture of volcanic rocks where almond-shaped vesicles are, fully or partially, filled with secondary minerals

3.1.19**analcime**

mineral, $\text{Na}(\text{AlSi}_2\text{O}_6)\text{H}_2\text{O}$ of the zeolite group

Note 1 to entry: See zeolite, secondary minerals.

3.1.20**andalusite**

mineral, Al_2SiO_5 polymorphous with sillimanite and kyanite

3.1.21**andesite**

volcanic rock of intermediate composition mainly composed of plagioclase (oligoclase - andesine) and one or more of the mafic minerals amphibole, pyroxene, and biotite

Note 1 to entry: See 4.2.1.5

3.1.22**anhedral**

(see allotriomorphic, 3.1.12)

3.1.23**anhydrite**

mineral with CaSO_4 formula

3.1.24**anisotropy**

vectorial behaviour of physical and mechanical properties in minerals and rocks, i.e. hardness in kyanite, thermal expansion in calcite, flexural resistance in slate

3.1.25**ankerite**

mineral of dolomite group with calcium and iron

3.1.26

anorthite

calcic plagioclase, $\text{Ca}(\text{Al}_2\text{Si}_2\text{O}_8)$

Note 1 to entry: See plagioclase.

3.1.27

anorthoclase

sodium-rich mineral of the alkali feldspar group, formula $(\text{Na,K})\text{AlSi}_3\text{O}_8$

Note 1 to entry: Its composition, in terms of the mole fraction of the orthoclase component (or) and the albite component (ab) is $\text{or}_{40}\text{ab}_{60}$ to $\text{or}_{10}\text{ab}_{90}$ (see feldspar, microcline, plagioclase, orthoclase).

3.1.28

anorthosite

plutonic rock mainly composed of anorthite – rich plagioclase and little or no mafic minerals

Note 1 to entry: See 4.2.1.2.

3.1.29

antiperthite

perthitic intergrowth of plagioclase host and subsidiary K-rich feldspar

3.1.30

apatite

group of minerals, of which the formula is $\text{Ca}_5(\text{PO}_4, \text{CO}_3)_3(\text{F}, \text{OH}, \text{Cl})$

3.1.31

aphanitic

of or relating to an igneous rock in which the crystals are so fine that individual minerals cannot be distinguished with the naked eye

Note 1 to entry: Aphanitic rocks are extrusive rocks that cooled so quickly that crystal growth was inhibited.

3.1.32

aplite

fine grained igneous rock of granitic composition with allotriomorphic texture and, commonly, leucogranitic composition

3.1.33

aragonite

mineral, polymorphous with calcite, of which the formula is CaCO_3

3.1.34

Archaean

the older eon of the Precambrian ranging from the formation of the Earth at ~4 000 Ma to 2 500 Ma

Note 1 to entry: See Table 1.

3.1.35

arenite

loose soil or consolidated sedimentary rock, mainly composed of sand size detrital lithic fragments or mineral grains (between 1/16 mm and 2 mm)

Note 1 to entry: Usually the term is used with a prefix that refers to its composition or genesis, e.g. quartzarenite (see 4.2.2.5).

3.1.36**argillite**

layered or not-layered consolidated sedimentary rock mainly composed of detrital clay size particles or clay minerals

3.1.37**arkose**

sedimentary detrital rock with less than 75 % vol. quartz and a high content of feldspar grains

Note 1 to entry: See 4.2.2.5.

3.1.38**arkosic wacke**

sandstone comprising >5 % vol. of sand grade particles, with the feldspar content exceeding that of rock fragments and >15 % vol. of mud matrix (material <30 µm in diameter)

3.1.39**ash**

fine-grained volcanic material

3.1.40**augen fabric**

fabric in some rocks, usually metamorphic, consisting of ellipsoidal or lens shaped porphyroblasts, crystals, or fragments, rounded and enveloped by the foliation, resembling eyes (augen) in a cross section

3.1.41**augen mylonite**

mylonite containing distinctive large crystals or lithic fragments around which the foliated fine-grained matrix is wrapped, often forming symmetric or asymmetric trails

3.1.42**augite****clinopyroxene**

mineral of the pyroxene group (clinopyroxenes), the general formula of which is $(\text{Ca,Na})(\text{Mg,Fe}^{2+},\text{Al})(\text{Si,Al})_2\text{O}_6$ with minor amounts of Na, Fe^{3+} , Al, Ti admitted, the colour of which is dark green to black, and which is an essential constituent in basic igneous rocks such as basalts and gabbros

3.1.43**bafflestone**

autochthonous carbonate rock whose original components were bound organically during deposition, the organisms forming baffles to trap finer matrix material

3.1.44**banded**

rock having alternating nearly parallel layers that differ in colour, fabric or mineral composition, and because of that it shows alternating bands in a cross section

3.1.45**basalt**

volcanic rock consisting essentially of plagioclase (labradorite-bytownite) and pyroxene with variable amount of phenocrysts set in a fine-grained matrix

Note 1 to entry: Commercially natural stone as per the scientific definition of basalt and other rocks such as, picrites, diabbases, dolerites and microgabbros.

Note 2 to entry: See 4.2.1.5.

3.1.46

basanite

silica-undersaturated alkali olivine basalt containing olivine, clinopyroxene and plagioclase feldspar with >10 % vol. feldspathoids in the form of nepheline or leucite, which is found in association with other alkaline igneous rocks

3.1.47

basic

Mg-, Fe- and Ca-rich igneous rock with more than 45 % vol. and less than 52 % vol. of silica

3.1.48

bed of blocks

unweathered rock beneath unconsolidated material formed by blocks

3.1.49

bedding plane

a) planar or nearly planar surface that visibly separates the individual beds, layers or strata, in sedimentary rocks;

b) any surface, even when conspicuously bent or deformed by folding

3.1.50

benmoreite

alkali lava intermediate in composition between mugearite and trachyte

3.1.51

bindstone

autochthonous carbonate rock whose original components were bound organically during deposition, with the organisms binding finer matrix material together

3.1.52

bioclastic rock

sedimentary rock consisting of fragments and broken remains of organisms; e.g. limestone composed of shell fragments

3.1.53

biolithite

limestone essentially constituted of reef structures, animal or plant

3.1.54

biotite

mafic rock forming mineral of the mica group with general formula $K(Mg,Fe^{2+})_3(Al,Fe^{3+})Si_3O_{10}(OH)_2$

3.1.55

black granite

commercial term for black or dark coloured plutonic rocks

Note 1 to entry: See e.g. gabbro, diabase, basalt.

3.1.56

blasto-

prefix used to describe the metamorphic rock fabrics denoting the presence of primary crystals or pre-existing fabric modified by metamorphism, but still recognized; e.g. blastogranular, blastomylonitic, blastopsephitic

3.1.57**blastomylonite**

mylonite which displays a significant degree of grain growth related to or following deformation

3.1.58**block**

angular fragment of rock with a diameter >256 mm

3.1.59**blue schist**

schist whose bluish colour is due to the presence of sodic amphibole

3.1.60**bomb**

mass of liquid lava thrown through the air which rotates and takes on a characteristic shape and structure

3.1.61**boundstone**

limestone, in which the grain were bound by an organism or organisms

3.1.62**breccia**

a) coarse grained clastic sedimentary rock composed by angular rock fragments held together by a mineral cement or in a fine grained matrix;

b) clastic rock consisting of highly angular gravel-size fragments, of sedimentary, tectonic or volcanic origin

3.1.63**calc silicate marble**

marble with calcium and silicate minerals

Note 1 to entry: See marble, ophicalcite.

3.1.64**calcarenite**

limestone consisting predominantly of recycled detrital calcite grains of sand size (1/16 mm – 2 mm)

3.1.65**calcareous**

containing calcium carbonate

3.1.66**calcilutite**

limestone consisting predominantly of detrital calcite grains or fragments of silt or clay size (<1/16 mm)

3.1.67**calciphyre**

metacarbonate rock containing a conspicuous amount of calcium- and/or magnesium-silicate minerals

3.1.68

calcirudite

limestone consisting predominantly of detrital calcite grains or fragments larger than sand size

Note 1 to entry: See rudite.

3.1.69

calcisiltite

limestone consisting predominantly of detrital calcite grains or fragments of silt size

3.1.70

calcite

mineral, the formula of which is CaCO_3 ; trimorphous with aragonite and vaterite

Note 1 to entry: Very common in some sedimentary and metamorphic rocks.

3.1.71

calcitic dolomite

carbonate rock which 50 % vol. to 89 % vol. of the mineral dolomite

Note 1 to entry: See also 4.2.2.11.

3.1.72

calcitic marble

marble containing more than 50 % vol. of calcite

3.1.73

calc-schist

carbonate silicate-schist

metamorphosed argillaceous limestone containing calcite as a substantial component and with a schistose structure produced by parallelism of platy minerals

Note 1 to entry: The term carbonate-silicate schist should be used when the non-carbonate mineral content is >50 % vol. See schist, 4.2.3.

3.1.74

Cambrian

oldest system and period into which the Palaeozoic is divided

Note 1 to entry: See Table 1.

3.1.75

carbonate

mineral containing CO_3^{2-} ; calcite, dolomite, magnesite, and siderite, etc. which are frequent rock forming carbonate minerals

3.1.76

carbonate rock

rock consisting chiefly of carbonate minerals, especially a sedimentary rock; limestone, dolomite, and carbonatite are examples of carbonate rocks

Note 1 to entry: See 4.2.2.8, 4.2.2.9, 4.2.2.10 and 4.2.2.11.

3.1.77**carbonate-silicate rock**

metamorphic rock mainly composed of silicate minerals (including calcium-silicate minerals) and containing between 5 % vol. vol and 50 % vol. vol of carbonate minerals

3.1.78**Carboniferous**

period and system of the Palaeozoic

Note 1 to entry: See Table 1.

3.1.79**cataclasite**

fault rock which is cohesive with a poorly developed or absent schistosity, or which is incohesive, characterised by generally angular porphyroclasts and lithic fragments in a finer-grained matrix of similar composition

Note 1 to entry: Generally, no preferred orientation of grains of individual fragments is present as a result of the deformation, but fractures may have a preferred orientation. A foliation is not generated unless the fragments are drawn out or new minerals grow during the deformation. Plastic deformation may be present but is always subordinate to some combination of fracturing, rotation and frictional sliding of particles. Cataclasite may be subdivided according to the relative proportion of finer-grained matrix into protocataclasite, mesocataclasite and ultracataclasite

3.1.80**cataclastic**

pertaining to the structure and texture produced in a rock by severe mechanical stress during dynamic metamorphism; bending, breaking, and fragmentation of the mineral grains are characteristic features; also said of the rocks exhibiting such structure

Note 1 to entry: See breccia.

3.1.81**cement**

mineral material, usually chemically precipitated during the rock compaction that occurs in the interstitial spaces among the individual grains of a sedimentary rock, thereby binding the grains together as a rigid mass; silica, carbonates and iron oxides are common cements

3.1.82**Cenozoic**

youngest era of geologic time

Note 1 to entry: See Table 1.

3.1.83**chalcedony**

group name for the compact varieties of silica composed of minute crystals of quartz with sub microscopic pores

3.1.84**chalcopyrite**

sulphide mineral, the formula of which is CuFeS_2

3.1.85

chalk

soft fine grained limestone, usually white consisting mostly of calcitic remains from microorganisms, and minor silt and clay

3.1.86

charnockite

orthopyroxene-bearing rock of granitoid composition

3.1.87

chert

fine-grained, hard, compact and dense sedimentary rock, consisting dominantly of the SiO_2 minerals quartz, chalcedony and opal. cryptocrystalline and/or amorphous silica

Note 1 to entry: Flint is a variety of chert.

3.1.88

chlorite Group

group of phyllosilicates, some of them of green colour, with general formula $(\text{Mg}, \text{Fe}^{2+}, \text{Fe}^{3+})_6 \text{AlSi}_3\text{O}_{10}(\text{OH})_8$

3.1.89

chloritoid

micaceous mineral, the formula of which is $\text{Fe}_2\text{Al}_4\text{Si}_2\text{O}_{10}(\text{OH})_4$

3.1.90

chromite

mineral, the formula of which is $(\text{Fe}, \text{Mg})(\text{Cr}, \text{Al})_2\text{O}_4$

3.1.91

chronostratigraphic unit

stage or zone which, independent of facies, represents a layer of specific age

3.1.92

cipollino marble

impure marble with band coloured structure, consisting in layers of calcite or dolomite grains mixed with variable quantities of silicate minerals

3.1.93

clast

mineral or rock fragment composing clastic sedimentary rocks

3.1.94

cisuralian

oldest epoch of the Permian

Note 1 to entry: See Table 1.

3.1.95

clastic

pertaining to a rock or sediment composed principally of broken fragments that are derived from pre-existing minerals, rocks or organic structures and that have been transported some distance from its original place

3.1.96**clay minerals**

group of minerals, essentially hydrous silicates of aluminium with a layered crystalline structure; iron, magnesium, potassium, and other cations are also present in their formula; the most common of which belong to illite, montmorillonite, and kaolinite mineral subgroups

3.1.97**clay slate
shale**

weakly metamorphosed clay stone with intermediate character between a clay stone and a true slate

3.1.98**clay**

loose, extremely fine grained sediment or soft rock composed of particles with diameters less than 0,002 mm, mainly of clay minerals and other minerals, especially quartz, feldspars, and carbonates

3.1.99**clay stone**

rock with more than 67 % vol. clay sized minerals

3.1.100**cleavage**

a) property of a rock to split along closely spaced planar surfaces (see slaty cleavage, crenulation cleavage, schistosity, and rough cleavage);

b) splitting of a mineral along its crystallographic planes, thus reflecting crystal structure

3.1.101**clinopyroxene**

monoclinic pyroxene exhibiting non-parallel extinction

3.1.102**columnar**

structure of some volcanic rocks, such as basalt, consisting of parallel, prismatic columns, polygonal in cross section, nearly perpendicular to the top and the bottom of the flow unit

3.1.103**comb layering**

fabric of igneous rocks consisting of bands of elongated crystals with nearly vertical mineral-elongation relative to the border of the bands

3.1.104**concretion**

collective term applied loosely to various primary and secondary segregations of diverse origin, including irregular nodules, spherulites, crystalline aggregates, geodes, septarias and related bodies

3.1.105**conglomerate**

coarse grained sedimentary rock composed of rounded to sub angular fragments (pebbles, cobbles, boulders), set in a fine grained matrix of sand or clay, and commonly cemented

3.1.106**consertal**

fabric of rocks showing toothed border lines between adjoining crystals

3.1.107

contact (between grains)

mode of relation between grains of rock-forming minerals; i.e. by points, by lines, within the matrix

3.1.108

coral rock

coral reef limestone

3.1.109

cordierite

silicate mineral, common in some metamorphic and rare in magmatic rocks, the formula of which is $(\text{Mg,Fe})_2 \text{Al}_4\text{Si}_5\text{O}_{18}$

3.1.110

corona

fabric of igneous or metamorphic rocks where minerals are surrounded by a seam of one or more other minerals

Note 1 to entry: Particular examples are the rapakivi fabric and kelyphitic rims.

3.1.111

Cretaceous

youngest of the periods/ and systems included in the Mesozoic era/erathem

Note 1 to entry: See Table 1.

3.1.112

cross bedding

cross stratification with thick individual beds

3.1.113

crossed twinning

lamellae of mineral twins after two laws making in thin sections a grid as seen in microcline

3.1.114

cryptocrystalline

composed of crystals so fine that they cannot be recognized even under polarizing microscope

3.1.115

crystal zoning

texture of igneous crystals with concentric layers made by inclusions or variations in chemical composition e.g. in plagioclases

3.1.116

dacite

volcanic rock with quartz, plagioclase, alkali feldspar, and often mafic components

Note 1 to entry: See 4.2.1.5.

3.1.117

dark mineral

mafic mineral

Fe-Mg rock forming minerals, e.g. olivine, pyroxenes, amphiboles and biotite

3.1.118**decussate**

metamorphic fabric of randomly oriented unequidimensional grains (e.g. pyroxenes, micas)

3.1.119**dedolomitization**

partial or complete calcification of dolomite

3.1.120**deformation fabric****tectonic fabric**

rock fabric resulting from deformation, as lineation, cleavages, schistosity, folds, preferred orientations of crystals etc.

Note 1 to entry: See fabric.

3.1.121**devitrification**

process of nucleation and growth of crystals in glasses at sub solidus temperatures

3.1.122**Devonian**

system of the Palaeozoic Erathem above the Silurian and below the Carboniferous

Note 1 to entry: See Table 1.

3.1.123**diabase**

medium grained rock of basaltic composition used in two ways: altered basaltic rocks (British) and ophitic texture (French, German and American)

3.1.124**diagenesis**

process of mineralogical changes in sediments after deposition which result in a consolidated rock

3.1.125**diamictite**

terrigenous sedimentary rock with particle sizes ranging from clay to boulder size

3.1.126**diatomite**

fine-grained, hydrated rock silica formed by the accumulation of the tests of diatoms

3.1.127**diorite**

plutonic rock mainly composed of plagioclase (-andesine), hornblende, and/or biotite

3.1.128**dip**

inclination of a bed to the horizontal; the dip is at a right angle to the strike

3.1.129

dolerite

igneous rock with basaltic composition, commonly with ophitic fabric

Note 1 to entry: See diabase.

3.1.130

dolomite mineral

mineral, the formula of which is $\text{CaMg}(\text{CO}_3)_2$

3.1.131

dolomite rock

carbonate rock with high percentage (90 % to 100 % of the mineral dolomite

3.1.132

dolomitic limestone

carbonate rock with 10 % vol. to 49 vol % vol. of the mineral dolomite

Note 1 to entry: See Table 6.

3.1.133

dolomitic marble

magnesian marble

marble containing more than 90 vol % vol. dolomite

3.1.134

dolostone

sedimentary rock made up of dolomite

Note 1 to entry: See Figure 15.

3.1.135

dunite

peridotite

medium - to coarse - grained ultramafic rock comprising >90 % vol. olivine, often of mantle origin

3.1.136

dyke

dike

tabular or nearly tabular body of igneous rock that cuts across the geological structure of surrounding rocks

3.1.137

eclogite

plagioclase-free coarsed-grained metamorphic rocks composed of ≥ 75 % vol. of omphacite and garnet

3.1.138

elongate fabric

fabric of granoblastic metamorphic rocks in which the crystals tend to be elongated with preferred orientation

3.1.139**Eocene**

epoch of Paleogene

Note 1 to entry: See Table 1.

3.1.140**eon**

large division of geological time

Note 1 to entry: See Table 2.

3.1.141**eonothem**

largest chronostratigraphic unit

Note 1 to entry: See Table 2.

3.1.142**epi-**

upon, above

3.1.143**epiclastic**

descriptive of sedimentary material redeposited from an existing sediment

3.1.144**epidote**

mineral $\text{Ca}_2(\text{Fe,Al})\text{Al}_2[\text{O}(\text{OH})(\text{SiO}_4)(\text{Si}_2\text{O}_7)]$, which is an igneous accessory, common in some metamorphic rocks

3.1.145**epoch**

third order geological time unit

Note 1 to entry: See Table 2.

3.1.146**equigranular fabric**

rock made of crystals of a similar relative size

3.1.147**era**

first order geological time unit

Note 1 to entry: See Table 2.

3.1.148**erathem**

first order chronostratigraphic unit, which consists of several adjacent systems

Note 1 to entry: See Table 2.

3.1.149

essential mineral

mineral that in a rock is used for its classification in main petrographic families or classes

Note 1 to entry: See quartz, alkali feldspar, plagioclase, feldspathoids, micas, amphiboles, pyroxenes, olivine, calcite, dolomite. See also EN 12407, *main minerals*.

3.1.150

essexite

plutonic rock corresponding to nepheline monzogabbro or nepheline monzodiorite composed essentially of labradorite plagioclase, minor alkali feldspar, feldspathoids (e.g. nepheline), and dark mafic minerals as titanian augite, kaersutite, and / or biotite

3.1.151

euohedral

idiomorphic

crystal with well-developed crystal faces

3.1.152

exfoliation

process by which concentric or parallel scales of rock are spalled out from the surface of a large rock mass

3.1.153

extrusive rocks

(see volcanic rock, 3.1.526)

3.1.154

fabric element

rock component that acts as a unit in deformation

3.1.155

fabric, depositional

fabric resulting from deposition of sediments

3.1.156

fabric, (growth)

fabric grown without stress and movement

3.1.157

fabric

relative orientation of parts of a rock mass; hence mega-, meso-, microfabric depending on scale

Note 1 to entry: See structure and texture.

3.1.158

facies

general appearance or nature of a rock mass, differentiating it from adjacent or associated ones

3.1.158.1

sedimentary facies

sum of lithological and paleontological characters exhibited by a sediment or sedimentary rock body and related to a given depositional environment

3.1.158.2**igneous facies**

varieties of a single igneous body that differ in structure or composition from the normal rock type of the mass

3.1.158.3**metamorphic facies**

set of metamorphic mineral assemblages repeatedly found in terranes of all ages around the world and showing a regular relationships between mineral composition and bulk chemical composition, so that different metamorphic facies can be related to different p-t conditions

3.1.159**fault gouge**

incohesive, clay-rich fine- to ultrafine-grained cataclasite which may contain a schistosity

Note 1 to entry: Lithic clasts may be present.

3.1.160**fault rock**

rock formed as a result of deformation in a fault zone

3.1.161**fault****fault zone**

planar dislocation along which there has been displacement of the rocks on one side relative to those on the other side

Note 1 to entry: This includes fracture zones and shear zones or a fracture surface or zone along which rocks have moved relative to each other. A zone of sheared, crushed or foliated rock, in which numerous small dislocations have occurred, adding up to an appreciable total offset of the undeformed walls, is a fault zone

3.1.162**feldspar**

group of silicate minerals with the chemical composition KAlSi_3O_8 (orthoclase, microcline), $\text{NaAlSi}_3\text{O}_8$ (albite), $\text{CaAl}_2\text{Si}_2\text{O}_8$ (anorthite) with certain miscibility of these components (see anorthite, microcline, orthoclase, sanidine, plagioclase)

3.1.163**feldspathic sandstone****subarkose**

sandstone rich in feldspar; intermediate in composition between arkosic sandstone and quartz sandstone

Note 1 to entry: See 4.2.2.5.

3.1.164**feldspathic**

containing feldspar in a considerable amount

3.1.165**feldspathoids****foiid**

group of alumino-silicate minerals with a variety of framework structures, similar to the feldspar but containing less silica, which is a characteristic of undersaturated alkaline igneous rock

3.1.166

felsic

containing feldspar, feldspathoids and other light-coloured silicates like quartz

3.1.167

ferruginous

containing iron or one of its components ferrous Fe^{2+} or ferric Fe^{3+}

3.1.168

fissile bedding

bedding with laminae less than 2 mm in thickness

3.1.169

fissility

property of splitting easily along closely spaced parallel planes

3.1.170

fissure

visible crack or fracture in the rocks

3.1.171

flint

nodular form of grey / black chert

Note 1 to entry: Term restricted to nodules of chert present in Cretaceous chalk.

3.1.172

flow fabric

alignment of inequidimensional mineral grains in an igneous rock in response to laminar flow

3.1.173

fluorite

mineral, the formula of which is CaF_2

3.1.174

foidite

feldspathoidite

general term for volcanic rocks containing more than 60 % vol. foids in total light – coloured constituents

3.1.175

foidolite

feldspatoidolite

general term for plutonic rocks containing more than 60 % vol. foids in total light – coloured constituents

3.1.176

fold

bend in formerly planar or tabular rock bodies

3.1.177

foliation

repetitively occurring or penetrative planar feature in a rock body (see cleavage)

3.1.178**formation**

basic stratigraphic unit identified by lithological characteristics and fossils

3.1.179**fossil**

remains or marks of animals or plants in sedimentary rocks

3.1.180**framestone**

autochthonous organically bound limestone in which the organisms formed a framework during deposition

3.1.181**Furongian**

youngest epoch of the Cambrian

Note 1 to entry: See Table 1.

3.1.182**gabbro**

coarse grained plutonic rock consisting of plagioclase (labradorite-anorthite), and mafic minerals as clinopyroxene, orthopyroxene, hornblende and olivine

Note 1 to entry: See 4.2.1.2 and 4.2.1.3.

3.1.183**garnet**

group of minerals of formula $X_3Y_2(SiO_4)_3$ where $X = Ca, Mg, Fe^{2+}, Mn^{2+}$ and $Y = Al, Fe^{3+}, Mn^{3+}, V^{3+}, Cr$

3.1.184**geode**

globular bodies in sediments or igneous rocks often containing fossils and crystals

3.1.185**geological structure**

a) macroscopic feature of a rock mass or rock unit, e.g. columnar structure, blocky fracture, platy parting, bedding;

b) general disposition, attitude, arrangement or relative positions of the rock units of a region or area, resulting from such geological processes as sedimentation, faulting, folding, igneous intrusion, etc.

3.1.186**glass**

congealed melt which failed to crystallize, but which is polymerized to some degree

3.1.187**glassy rock**

rock consisting partly or wholly of glass, usually formed when magma is quenched too rapidly for crystallization to occur, but also forming in a fault rock by dynamic metamorphism (pseudotachylite) or by thermal metamorphism (buchite)

3.1.188

glauconite

green mineral of the phyllosilicates group originated in sedimentary rocks, formula $(K,Na)(Al,Fe^{3+},Mg)_2(Al,Si)_4O_{10}(OH)_2$

3.1.189

gneiss

metamorphic rock mainly consisting of quartz, feldspar and mica, in which bands rich in granular minerals such as feldspar and quartz, alternate with bands of planar minerals like mica

Note 1 to entry: Might derive from an igneous rock (Orthogneiss) or from a sedimentary rock (Paragneiss) (see Leptite and 4.2.3).

3.1.190

gneissose

gneissic fabric

a) structure characterized by a poorly or well developed schistosity through the rock, so that it splits on a scale of more than one centimetre

b) fabric in metamorphic rocks in which bands rich in granular minerals alternate with bands of planar minerals

3.1.191

goethite

“rust-like” hydrated oxide of iron produced by the weathering of iron metal, with formula $\alpha\text{-FeO.OH}$

3.1.192

graded bedding

stratification in which each stratum shows a gradation in grain size from coarse to fine

3.1.193

grain size

predominant diameter of particles in a rock as observed

3.1.194

grain

particle of a rock e.g. the crystals in a granite

3.1.195

grainstone

carbonated sedimentary rock with joined grains without finely crystalline cement

3.1.196

granite

plutonic rock consisting essentially of quartz, alkali feldspar and sodic plagioclase in variable amounts, usually with biotite and/or hornblende

Note 1 to entry Commercially compact and polishable natural stone, used in decoration and building, mainly consisting of minerals with a hardness between 5 and 7 on the Mohs scale, such as quartz and feldspar, e.g. granite as per the scientific definition, other plutonic rocks, volcanic rocks with porphyritic structure, metamorphic rocks with mineralogical composition similar to granitoids such as gneiss, black granites (see 3.1.55) and limestone in some regions of Europe (see hardness scale).

Note 2 to entry: See 4.2.1.2.

3.1.197**granitoid**

term for any granitic rock

3.1.198**granoblastic**

mosaic fabric of more or less equidimensional and even sized crystals

3.1.199**granodiorite**

plutonic rock consisting essentially of quartz, sodic plagioclase, and less amounts of hornblende and biotite

3.1.200**granofels**

granular metamorphic rock under any metamorphic grade

3.1.201**granofelsic structure**

type of metamorphic structure resulting from the absence of schistosity such that the mineral grains and aggregates of mineral grains are equant, or if inequant have a random orientation

3.1.202**granophyric**

intergrowth of quartz and K-Na-feldspar of intermediate composition

3.1.203**granular**

rocks with all crystals approximately of equal size

3.1.204**granulite**

high grade metamorphic rock with K-feldspar, quartz and garnet and/or different other mafic minerals and no primary muscovite

3.1.205**graphic**

fabric of igneous rocks resulting from intergrowth quartz and either K-rich or Na-rich feldspar

3.1.206**graphite**

mineral, one of the two naturally occurring forms of crystalline carbon, the other being diamond

3.1.207**greenschist**

schistose metamorphic rock with albite chlorite, epidote, or actinolite

3.1.208**greenstone**

old field term indicating an altered igneous rock with chlorite, hornblende, epidote

3.1.209

greywacke

detritic sedimentary rock with a fairly abundant cement rich in clay minerals

Note 1 to entry: See 4.2.2.6.

3.1.210

grit

sedimentary rock with coarse and angular grains

3.1.211

groundmass

fine-grained and/or glassy material surrounding the phenocrysts in a porphyritic volcanic rock

3.1.212

growth fabric

crystal arrangement determined by more or less free growth from a surface or an edge

3.1.213

Guadalupian

middle epoch of the Permian

Note 1 to entry: See Table 1.

3.1.214

gypsum

mineral $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ also called selenite; the dense varieties are called alabaster

3.1.215

habit

characteristic crystal form or combination of forms of a mineral, including characteristic irregularities when idiomorphic

3.1.216

Hadean

era of the Precambrian

Note 1 to entry: See Table 1.

3.1.217

harzburgite

ultramafic/ultrabasic rock composed of >40 % vol. olivine, 5-60 % vol. orthopyroxene and <5 % vol. clinopyroxene. Forms the residue when basaltic magma is derived from mantle lherzolite, so it is found in ultramafic xenoliths in alkali basalts and in the mantle part of ophiolites

3.1.218

hawaiiite

alkaline volcanic rock containing andesine plagioclase (An_{30-50}), pyroxene, iron-titanium-oxide $\pm$ minor quartz or nepheline

3.1.219

heavy minerals

accessory minerals with a density greater than 2,9 g/cm³

3.1.220**hematite**

major ore mineral of iron, also found as an accessory mineral in many rocks, with formula Fe_2O_3

3.1.221**heteroblastic fabric**

metamorphic rock composed of crystals with a range of sizes

3.1.222**Holocene**

youngest epoch of the Quaternary

Note 1 to entry: See Table 1.

3.1.223**holocrystalline**

rock consisting entirely of crystalline phases

3.1.224**holohyaline**

rock consisting entirely of glass

3.1.225**homeoblastic**

metamorphic rock composed of crystals of approximately equal size

3.1.226**hornblende**

monoclinic Ca-amphibole with Al_2O_3 and Fe_2O_3

Note 1 to entry: See amphibolite.

3.1.227**hornblendite**

plutonic igneous rock composed almost completely of hornblende

3.1.228**hornfels**

hard, compact contact-metamorphic rock of any grain size, dominantly composed of silicate + oxide minerals in varying proportions, with a horny aspect and a subconchoidal to jagged fracture.

Note 1 to entry: Traditionally hornfels carried qualifiers referring to the nature of the parent rock (e.g. basic hornfels, pelitic hornfels)

3.1.229**host**

a) mineral containing an inclusion

b) rock body containing other small bodies

3.1.230**hydrothermal**

adjective applied to processes, formations, and products, usually of magmatic origin, made by hot water or steam

3.1.231

hypidioblastic fabric

mineral constituent of a metamorphic rock which is bounded only in part by its own crystal faces

3.1.232

hypidiomorphic

subhedral

mineral grain in an igneous rock which is bounded by only some of its crystal faces

3.1.233

idioblastic

mineral constituent of a metamorphic rock which is wholly bounded by its own crystal faces

3.1.234

igneous rock

rock formed by solidification from molten material (magma)

3.1.235

ignimbrite

pyroclastic volcanic rock either welded on deposition or subsequently lithified

3.1.236

illite

clay mineral of the phyllosilicate group

3.1.237

impactite

shock-metamorphosed rock, including breccias, finely crystalline or glassy material produced by a meteorite impact, e.g. suevite

3.1.238

inclusion

small crystal, fragment, gas, or liquid filled void within a larger crystal

3.1.239

intergranular fabric

typical of basalts, it consists of relatively equidimensional clinopyroxene and magnetite grains set amongst a framework of elongate feldspar microphenocrysts

3.1.240

intergrowth

re-crystallization

term applied to the interlocking of different crystals due to simultaneous crystallisation

3.1.241

intermediate rock

rock with < 10 % vol. quartz plus either plagioclase in the range An₁₀₋₅₀, or an alkali feldspar or both alkali and plagioclase feldspars

3.1.242

intersertal fabric

fabric in volcanic rocks, where the spaces between a framework of elongate feldspar microphenocrysts are filled with glass (or its alteration products)

3.1.243**intraclast**

fragment of typically weakly consolidated sediment reworked from within the area of deposition

3.1.244**intrusive rock**

medium- to coarse-grained igneous rocks deriving from solidification of magma emplaced within a host rock

3.1.245**ironstone**

clayey or compact rock consisting largely of iron minerals

3.1.246**jasper**

granular, microcrystalline variety of quartz, usually coloured red by hematite

3.1.247**Jurassic**

system of Mesozoic

Note 1 to entry: See Table 1.

3.1.248**K-feldspar**

potassium feldspar

Note 1 to entry: See microcline, orthoclase, and sanidine.

3.1.249**kaolinite**

common clay mineral formed by the weathering or hydrothermal alteration of feldspars and other aluminous silicate minerals, with general formula $\text{Al}_2(\text{Si}_2\text{O}_5)(\text{OH})_4$

3.1.250**karst**

landscape and structures developed in limestone, gypsum, and other soluble rocks by the effects of solution weathering

3.1.251**kelyphitic rims**

corona structure composed of microcrystalline aggregates of fibrous pyroxene or amphibole developed around olivine or garnet

3.1.252**kyanite****disthene**

mineral, polymorphous with andalusite and sillimanite, the formula of which is Al_2SiO_5

3.1.253

labradorescence

schiller

optical phenomenon consisting of flashes or iridescence visible when the mineral or rock is moved in the light, as seen in some Ca-rich plagioclases

Note 1 to entry: See feldspar, plagioclase.

3.1.254

laccolith

concordant, flat-floored, dome like intrusion which arches the overlying host rocks

3.1.255

lamprophyre

dark igneous dyke rock characterised by abundant mafic phenocrysts, most commonly biotite, hornblende or augite

3.1.256

lapilli

pyroclast of any shape with a mean diameter between 2 and 64 mm

Note 1 to entry: See 4.2.1.6.

3.1.257

larvikite

augite syenite or monzonite characterised by the distinctive blue labradorescence of its rhomb shaped feldspars

3.1.258

latite

volcanic rock with roughly equal proportions of plagioclase and alkali feldspar

Note 1 to entry: See Figure 6.

3.1.259

lava

magma which is extruded from a volcano or fissure in the earth's surface; also the volcanic rock that is solidified from it

3.1.260

layer

bed or stratum of rock

3.1.261

lepidoblastic fabric

textural term applied to the parallel alignment of sheet silicate minerals, such as micas and chlorites in metamorphic rocks

3.1.262

leptite

obsolete term for fine-grained, equigranular often banded rock of granitic composition, often resulting from metamorphism of a volcanic rock or by thermal metamorphism of other rocks; e.g. hälleflinta

3.1.263**leucite**

feldspathoid mineral, KAlSi_2O_6 , occurring in potassium rich volcanic rocks

3.1.264**leuco**

prefix meaning white, weakly coloured, or colourless

3.1.265**leucocratic**

igneous rock whose colour index (M') ranges from 10 to 35, where M' is M (mafic minerals) minus any muscovite, apatite and primary carbonates (i.e. colourless minerals in plane-polarized transmitted microscopy)

3.1.266**herzolite**

phaneritic rock similar to peridotite which contains 40-90 % vol. olivine, >5 % vol. orthopyroxene and >5 % vol. clinopyroxene with accessory plagioclase, spinel $\pm$ garnet, which yields basaltic magma on partial melting, so is taken as a model for the composition of the upper mantle, which occurs in some ophiolites and as xenoliths in alkali basalts, lamproites and kimberlites

3.1.267**light mineral**

rock forming minerals with a density less than $2,9 \text{ g/cm}^3$, e.g. quartz, feldspar

3.1.268**limestone**

sedimentary rock consisting chiefly of calcite, CaCO_3

Note 1 to entry: See 4.2.2.8 and 4.2.2.9.

3.1.269**limonite**

hydrated iron oxide $\text{FeO} \cdot \text{OH} \cdot n\text{H}_2\text{O}$

3.1.270**lineation**

general descriptive term for any kind of linear (one dimensional) feature in the fabric of a rock

3.1.271**lithic tuff**

pyroclastic tuff composed predominantly of rock fragments

Note 1 to entry: See 4.2.1.5.

3.1.272**lithic**

term applied to rock fragments

3.1.273**lithification**

conversion of an incoherent sediment into a rock

3.1.274

lithographic limestone

extremely fine grained micritic limestone

3.1.275

lithographic structure

term used to describe grain size in calcareous sedimentary rocks, where it is homogeneous and very fine (clay size)

3.1.276

lithology

general character of a rock unit, particularly as seen in field-exposures and hand specimens; i.e., its mineral composition, fabric, primary structures, and the smaller-scale secondary structures

3.1.277

lithostratigraphy

stratigraphy based on the petrological characteristics of the rocks

3.1.278

lithotype

rock defined on the basis of certain selected petrological characteristics

3.1.279

llandovery

oldest epoch of the Silurian

Note 1 to entry: See Table 1.

3.1.280

longrain

preferred direction of cut in slates and other rocks

3.1.281

Lopingian

youngest epoch of the Permian

Note 1 to entry: See Table 1.

3.1.282

Ludlow

epoch of the Silurian

Note 1 to entry: See Table 1.

3.1.283

lumachella

limestone consisting of fossil mollusc shells like bivalves

3.1.284

macrostructure

structural feature of a rock which can be seen without magnification

3.1.285**mafic**

term referring to ferromagnesian silicate minerals and rocks composed largely of these minerals

Note 1 to entry: See dark mineral.

3.1.286**magma**

molten or partially molten rock material, from which igneous rocks are derived through solidification

3.1.287**magnesian limestone****dolomitic limestone**

carbonate rock with 10 to 49 % vol. of the mineral dolomite

Note 1 to entry: See 4.2.2.11.

3.1.288**magnesite**

carbonate mineral, source of magnesia, formula MgCO_3

3.1.289**magnetite**

strongly magnetic mineral, formula $(\text{Fe,Mg})\text{Fe}_2\text{O}_4$

3.1.290**main minerals**

rock-forming minerals that occur in sufficient amount to be used in the classification of the rock

3.1.291**marble**

metamorphic rock containing more than 50 % vol. of carbonates (calcite and/or aragonite and/ or dolomite) formed by metamorphic recrystallization of a carbonate rock

Note 1 to entry: Impure marbles contain between 50 and 95 % vol. carbonates, pure marbles contain > 95 % vol. carbonates.

Note 2 to entry: Commercially compact and polishable natural stone, used in decoration and building, mainly consisting of minerals with hardness between 3 and 4 on the Mohs scale (such as calcite, dolomite or serpentine), e.g. marbles as per the scientific definition and cipollino marbles, as well as the following natural stones, provided that they are capable of taking a mirror polish: limestone marbles, limestones, dolomites, calcareous breccias, travertines and serpentinites (see Mohs scale).

3.1.292**marl**

sedimentary rock which is a mixture of calcite and clay (35-65 % vol. vol clay), with very occasionally dolomite

3.1.293**massive**

of homogenous structure, without stratification, foliation, flow banding, schistosity, and the like, said of some rocks e.g. granites and limestones from reefs