

How Are Metamorphic Rocks Created

Amphibolite frequently forms by metamorphism of mafic igneous rocks, such as basalt. However, because metamorphism creates minerals entirely based upon the chemistry of the protolith, certain 'dirty marls' and volcanic sediments may also metamorphose to an amphibolite assemblage. Deposits containing dolomite and siderite also readily yield amphibolite (tremolite-schist, grunerite-schist, and others) especially where there has been a certain amount of contact metamorphism by adjacent granitic masses. Metamorphosed basalt (metabasalt) creates ortho-amphibolite and other chemically appropriate lithologies create

para-amphibolite. 5bb169d441

Sedimentary rock Biological detritus is formed by bodies and parts (mainly shells) of dead aquatic organisms, as well as their fecal mass, suspended in water and slowly piling up on the floor of water bodies (marine snow). crust. e. Sedimentary rocks are deposited in layers Sedimentary rocks are types of rock formed by the cementation of sediments—i. Sedimentation is any process that causes these particles to settle in place. Sedimentary rocks are only a thin veneer over a crust consisting mainly of igneous and metamorphic rocks. particles made of minerals (geological detritus) or organic matter (biological detritus)—that have been accumulated or deposited at Earth's surface. Geological detritus originates from weathering and erosion of existing rocks, or from the solidification of molten lava blobs erupted by volcanoes.

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Sedimentation may also occur when dissolved minerals precipitate from water solution. The geological detritus is transported to the place of deposition by water, wind, ice or mass movement, which are called agents of denudation

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Samail Ophiolite It is one of the world's largest and best-exposed segments of oceanic crust, made of volcanic rocks and ultramafic rocks from the Earth's upper mantle that was overthrust onto the continental crust. The metamorphic rocks include garnet and clinopyroxene-bearing granulite, hornblende and The Samail Ophiolite, also known as the Semail Ophiolite, is a large, ancient geological formation in Oman and the United Arab Emirates in the Arabian Peninsula. located in southwestern Oman near the classic Green Pool locality. This ophiolite provides insight into the dynamics of oceanic crust

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formation and the tectonic processes involved in the creation of ocean basins
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Rocks exposed to the atmosphere are variably unstable and subject to the processes of weathering and erosion. Weathering and erosion break the original rock down into smaller fragments and carry away dissolved material. The transportation and deposition of these fragments occurs through natural agents. This fragmented material accumulates and is buried...
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Rock cycle This cyclical aspect makes rock change a geologic cycle and, on planets containing life, a biogeochemical cycle. The rock cycle explains how the three rock types are related to each other, and how processes change from one type to another over time. the three main types of rocks (igneous, sedimentary, and metamorphic rocks) can melt into

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magma and cool into igneous rocks. Epigenetic change (secondary The rock cycle is a basic concept in geology that describes transitions through geologic time among the three main rock types: sedimentary, metamorphic, and igneous. For example, an igneous rock such as basalt may break down and dissolve when exposed to the atmosphere, or melt as it is subducted under a continent. Due to the driving forces of the rock cycle, plate tectonics and the water cycle, rocks do not remain in equilibrium and change as they encounter new environments. Each rock type is altered when it is forced out of its equilibrium conditions

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Talc carbonate talc carbonate metamorphic assemblages are diagnostic of the magnesium content of the ultramafic protolith. Lower-magnesian ultramafic rocks (12-18% MgO Talc carbonates are a suite of

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rock and mineral compositions
found in metamorphosed
ultramafic rocks 5bb169d441

== Geological significance ==
5bb169d441 Formed during the
Late Cretaceous period,
approximately 95 million years
ago, the Samail Ophiolite
represents a fragment of the
Tethyan Oceanic crust that was
thrust over continental crust due
to the convergence of the African
and Eurasian tectonic plates.
This geological phenomenon,
known as obduction, makes it a
site for studying the processes of
oceanic crust formation,
subduction, and obduction.
5bb169d441 Igneous rocks occur
in a wide range of geological
settings: shields, platforms,
orogens, basins, large igneous
provinces, extended crust and
oceanic crust. 5bb169d441
Igneous rocks are also
geologically important...
5bb169d441 Igneous and
metamorphic rocks make up
90-95% of the top 16 kilometres

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(9.9 mi) of the Earth's crust by volume. Igneous rocks form about 15% of the Earth's current land surface. Most of the Earth's oceanic crust is made of igneous rock. 5bb169d441 == Transition to sedimentary rock == 5bb169d441 Greenschist is defined by the presence of... 5bb169d441 The magma can be derived from partial melts of existing rocks in a terrestrial planet's mantle or crust. Typically, the melting is caused by one or more of three processes: an increase in temperature, a decrease in pressure, or a change in composition. Solidification into rock occurs either below the surface as intrusive rocks or on the surface as extrusive rocks. Igneous rock may form with crystallization to form granular, crystalline rocks, or without crystallization to form natural glasses. 5bb169d441 It covers an area of around 100,000 square kilometers, and is a complete and well-preserved stratigraphic

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section. This includes layers from the Earth's upper mantle, along with cumulate rocks, gabbros, sheeted dike complexes, and volcanic sequences, providing a vertical profile of oceanic...

5bb169d441 == Rock type ==

5bb169d441 Metamorphic

petrology is the study of metamorphism. Metamorphic petrologists rely heavily on statistical mechanics and experimental petrology to understand metamorphic processes. 5bb169d441

Amphibolite It is typically dark-colored and dense, with a weakly foliated or schistose (flaky) structure. Igneous rocks with greater than 90% amphiboles, which have a feldspar groundmass, may be lamprophyres. The small flakes of black and white in the rock often give it a salt-and-pepper appearance. Metamorphic rocks composed primarily Amphibolite () is a metamorphic rock that contains amphibole, especially

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hornblende and actinolite, as well as plagioclase feldspar, but with little or no quartz. cumulate rock 5bb169d441

Greenschist Other common minerals include quartz, orthoclase, talc, carbonate minerals and amphibole (actinolite). Greenschists commonly have an abundance of green minerals such as chlorite, serpentine, and epidote, and platy minerals such as muscovite and platy serpentine. Greenschists are metamorphic rocks that formed under the lowest temperatures and pressures usually produced by regional metamorphism, typically 300–450 °C Greenschists are metamorphic rocks that formed under the lowest temperatures and pressures usually produced by regional metamorphism, typically 300–450 °C (570–840 °F) and 2–10 kilobars (29,000–145,000 psi). The platiness gives the rock schistosity (a tendency to split

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into layers) 5bb169d441

Metamorphism Metamorphism is distinct from weathering or diagenesis, which are changes that take place at or just beneath Earth's surface. Metamorphism usually takes place at temperatures in excess of 150 °C (300 °F), and often also at elevated pressure or in the presence of chemically active fluids, but the rock remains mostly solid during the transformation. Metamorphic rocks are typically more coarsely crystalline than the protolith from which they formed. Atoms in the interior of a crystal are surrounded Metamorphism is the transformation of existing rock (the protolith) to rock with a different mineral composition or texture. (porphyroblasts) 5bb169d441

Talc carbonate mineral assemblages are controlled by temperature and pressure of metamorphism and the partial

pressure of carbon dioxide within metamorphic fluids, as well as by the composition of the host rock. 5bb169d441 The term refers to the two most common end-member minerals found within ultramafic rocks which have undergone talc-carbonation or carbonation reactions: talc and the carbonate mineral magnesite. 5bb169d441 Lithology is the basis of subdividing rock sequences into individual lithostratigraphic units for the purposes of mapping and correlation between areas. In certain applications, such as site investigations, lithology is described using a standard terminology such as in the European geotechnical standard Eurocode 7. 5bb169d441 Although tremolite is a metamorphic amphibole, it is most commonly derived from highly metamorphosed ultramafic rocks, and thus tremolite-talc schist is not generally considered a variety of amphibolite. A holocrystalline... 5bb169d441 ==

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Continental crust ==
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Basement (geology) basement rocks lie below a sedimentary platform or cover, or more generally any rock below sedimentary rocks or sedimentary basins that are metamorphic or igneous In geology, basement and crystalline basement are crystalline rocks lying above the mantle and beneath all other rocks and sediments. In the same way, the sediments or sedimentary rocks on top of the basement can be called a "cover" or "sedimentary cover". They are sometimes exposed at the surface, but often they are buried under miles of rock and sediment. The basement rocks lie below a sedimentary platform or cover, or more generally any rock below sedimentary rocks or sedimentary basins that are metamorphic or igneous in origin
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Lithology Examples of lithologies in the second sense include sandstone, slate, basalt, or limestone. Metamorphic rocks (apart from those created by contact metamorphism), are characterised by well-developed planar and linear fabrics. Physical characteristics include colour, texture, grain size, and composition. Lithology may refer to either a detailed description of these characteristics, or a summary of the gross physical character of a rock. Igneous rocks may The lithology of a rock unit is a description of its physical characteristics visible at outcrop, in hand or core samples, or with low magnification microscopy 5bb169d441

Various forms of metamorphism exist, including regional, contact, hydrothermal, shock, and dynamic metamorphism. These differ in the characteristic temperatures, pressures, and rate at which they take place and in the extent to which reactive

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fluids are involved.

Metamorphism occurring at increasing pressure and temperature conditions is known as prograde metamorphism, while decreasing temperature and pressure characterize retrograde metamorphism.

5bb169d441 Greenschist is a general field petrologic term for metamorphic or altered mafic volcanic rock. In Europe, the term prasinite is sometimes used.

A greenstone is sometimes a greenschist but can also be rock types without any schistosity, especially metabasalt (spilite).

However, basalts may remain quite black if primary pyroxene does not revert to chlorite or actinolite. To qualify for the name, a rock must also exhibit schistosity or some foliation or layering. The rock is derived from basalt, gabbro or similar rocks containing sodium-rich plagioclase feldspar, chlorite, epidote and quartz. 5bb169d441

In a general sense, talc carbonate metamorphic

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assemblages are diagnostic of the magnesium content of the ultramafic protolith. 5bb169d441
The sedimentary rock cover of the continents of the Earth's crust is extensive (73% of the Earth's current land surface), but sedimentary rock is estimated to be only 8% of the volume of the crust. Sedimentary rocks are only a thin veneer over a crust consisting mainly of igneous and metamorphic rocks.
Sedimentary... 5bb169d441

Igneous rock Igneous rocks are formed through the cooling and solidification of magma or lava
Igneous rock (igneous from Latin igneus 'fiery'), or magmatic rock, is one of the three main rock types, the others being sedimentary and metamorphic.
the three main rock types, the others being sedimentary and metamorphic. Igneous rocks are formed through the cooling and solidification of magma or lava
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Basement rock consists of continental crustal rock which has been modified several times through tectonic events including deformation, metamorphism, deposition, partial melting and magmatism. 5bb169d441

Basement rock is the thick foundation of ancient, and oldest, metamorphic and igneous rock that forms the crust of continents, often in the form of granite. Basement rock is contrasted to overlying sedimentary rocks which are laid down on top of the basement rocks after the continent was formed, such as sandstone and limestone. The sedimentary rocks which may be deposited on top of the basement usually form a relatively thin veneer, but can be... 5bb169d441 ==

Compositional controls ==
5bb169d441 == Metamorphic processes == 5bb169d441 ==
Petrology == 5bb169d441

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