

BASIC ROCK COLLECTION

INFORMATION SHEET 8 (CASES 139-140-141/268-269)

Rock is an aggregate of minerals and/or fragments of other rocks which may or may not be consolidated, and forms part of the lithosphere (the Earth's outer surface). Most rocks are made up of several minerals, although some are composed of a single mineral. They can also be composed of non-crystalline material (glassy solids). Rocks are divided into three main groups: sedimentary, metamorphic and igneous rocks.



**CASE 139
SEDIMENTARY ROCKS**

These are formed on the Earth's surface. They are divided into three groups: 1) clastic rocks, formed from fragments (clasts) of other rocks after a transport phase; 2) chemical rocks, formed by precipitation of chemical compounds in aqueous solutions; and 3) organic rocks, formed by accumulation of organic remains (coal, petroleum).

CONGLOMERATES (BRECCIA)

These are clastic sedimentary rocks formed by the consolidation of pre-existing fragments of other rocks. Conglomerates can be considered as consolidated gravels. They are composed of thick clastic elements bound together by a cement. They are termed "breccia" when the clasts are angular, indicating that they have undergone little transport and therefore, little erosion, and "pudding stone" when the clasts are rounded.

Peña Careses, Pola de Siero (Asturias, Spain).
Maximum dimension: 15 cm.



**CASE 140
METAMORPHIC ROCKS**

Metamorphic rocks are formed from pre-existing rocks that have undergone mineralogical, textural and structural changes due to increased pressure and/or temperature. They are divided into three groups: 1) regional metamorphism: increased pressure and temperature on a large scale over a wide area; 2) contact metamorphism: related to the injection of magma; and 3) dynamic metamorphism: restricted to local areas on a fault plane.

AUGEN GNEISS

Metamorphic rock formed by regional metamorphism. Gneiss presents alternating bands of dark minerals (e.g. iron and magnesium) and light minerals (e.g. quartz and feldspar) that are visible to the naked eye. In addition, augen gneiss also presents large crystals between the finer banding described above.

Cabanillas de la Sierra (Madrid, Spain).
Maximum dimension: 10 cm.



**CASE 141
IGNEOUS ROCKS**

These rocks are formed by solidification (crystallisation) of silicic lava or magma. Crystallisation can occur deep below the Earth's crust, giving rise to plutonic rocks (e.g. granite) or on the Earth's surface, forming volcanic rocks (e.g. basalt).

GRANITE

This plutonic igneous rock is basically composed of quartz, feldspar and mica. In this case it presents an equigranular texture because the crystals are all approximately the same size. It forms as a result of slow cooling of magma beneath the Earth's surface.

Manzanares el Real,
(Madrid, Spain).
Maximum dimension: 14 cm.

BASALT, PÁHOEHOE LAVA

Volcanic igneous rock mainly composed of plagioclase and pyroxene, with or without olivine. Basaltic lavas are very fluid and solidify on the surface forming prismatic flows, rough surfaces or, as in this case, superimposed and intertwining ropey structures.

Los Llanos de Aridane, (La Palma, Santa Cruz de Tenerife, Spain).
Maximum dimension: 23.5 cm.



**CASE 268
NATURAL GLASSES**

Natural glasses arise from a variety of processes, including volcanic activity, falling meteorites and lightning strikes. They are formed through a process of fusion and rapid cooling.

FULGURITE

The term “fulgurite” (from the Latin *fulgur*, meaning lightning) is used to designate rocks formed by the action of atmospheric electrical discharges on a silicic substrate (soil or rock), causing fusion and rapid cooling. Fulgurites normally consist of hollow tubes with dimensions in the order of centimetres. This fulgurite from Torre de Moncorvo was formed when lightning struck a surface composed of granite rocks, granitic sand and clay.

Torre de Moncorvo (Portugal).
Maximum dimension: 12.5 cm.



**CASE 268
IMPACTITES**

Impactites are rocks either formed or modified by the impact of a meteorite, which produces a rapid increase in rock pressure and temperature. This process is known as shock metamorphism.

SUEVITE

Suevite is composed of fragments of rock, minerals and glass (melted fragments) embedded in a matrix of a similar but more finely-grained composition. It is halfway between an impact breccia and an impact melt rock.

Seelbronn (Germany).
Maximum dimension: 14 cm.



**CASE 269
METEORITES**

Meteorites are defined as particles rotating around the Sun or objects from outer space too small to be considered asteroids or comets that reach the surface of the Earth without being completely destroyed in their passage through the atmosphere. However, the outer layers are partially melted, creating a glassy coating called a fusion crust. If the meteorite is sufficiently large, it produces a crater at the point of impact. In general, meteorites are divided into three groups: iron meteorites, stony-iron meteorites and stony meteorites.

IRON METEORITES

These are composed of over 90% iron (Fe) and nickel (Ni). Depending on temperature and the relative percentage of Fe and Ni, different proportions are commonly formed of two minerals that constitute different alloys of these metals: kamacite (5-6% Ni) and taenite (\approx 30% Ni). Troilite (FeS) is also common. Iron meteorites characteristically present a texture known as a Widmanstätten pattern: criss-crossing bands of kamacite and taenite.

Campo del Ceilo (Chaco, Argentina).
Maximum dimension: 13 cm.

STONY-IRON METEORITES (PALLASITES)

Stony-iron meteorites present characteristics of both stony and iron meteorites in that they consist of nearly equal amounts of metals (Fe-Ni) and non-metals (mostly troilite and silicate). Pallasites are a type of stony-iron meteorite composed of large olivine crystals forming an inclusion in a metallic matrix (Fe-Ni).

Brahin (Belarus).
Maximum dimension: 9.5 cm.

STONY METEORITES (CHONDRITES)

These meteorites contain little Fe-Ni metal and consequently resemble terrestrial rocks. It is therefore very difficult to identify specimens unless their fall to Earth has been clearly observed. Chondrites are stony meteorites that contain approximately 10% Fe-Ni. They account for 86% of all meteorites on Earth.

Villalbeto de la Peña (Palencia, Spain).
Maximum dimension: 6.5 cm.