SPROCKS

RockyBox - Additional Rock Kit

Datasheet
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Introduction

The SPROCKS RockyBox includes a curated collection of rocks and an UV lamp. The rock samples such as Red Calcite, Chalcopyrite, Pink Jasper, Tiger's Eye Quartz, Rhyolitic Ignimbrite, Diorite, Megabreccia, and Pitchblende, enrich the experimental possibilities offered by RockyRAD, allowing users to compare geological materials with different compositions and origins, and to observe how these differences may correlate with variations in detected radiation levels.

In particular, some of the minerals included in RockyBox—most notably Pitchblende and certain igneous formations—are known to exhibit higher levels of natural radioactivity compared to the standard samples provided with RockyRAD. This makes the kit especially valuable for advanced educational activities, where students can explore more pronounced contrasts in radiation intensity, while still operating within a controlled and safe laboratory environment.

Together, RockyRAD and RockyBox form an integrated learning platform that supports a more comprehensive and nuanced understanding of nuclear physics, geoscience, and environmental radiation.

Description

The RockyBox has been enriched with a further selection of eight specimens, chosen to represent a variety of lithotypes of geological, geochemical and radiometric interest. These rocks and minerals provide opportunities for in-depth study of the origin of Earth materials, their composition, and, in some cases, their relevance in the context of natural radioactivity measurements.

RockyBox Packaging

A brief description of each is provided below.

Red Calcite

Calcite is a common carbonate mineral with the chemical formula $CaCO_3$. The “red” variety is distinguished by the presence of iron impurities, primarily hematite, which give it a deep reddish-brown color. It forms by chemical precipitation from calcium- and bicarbonate-rich waters, typically in sedimentary environments, but also as a hydrothermal vein filling. From a geochemical point of view, red calcite maintains the same structure as pure calcite, but with local enrichment in iron. Its natural radioactivity is usually negligible, although it may contain trace amounts of radium-226 if formed in mineralized environments.

Chalcopyrite

Chalcopyrite ($CuFeS_2$) is the most abundant copper sulfide in the Earth's crust and the primary industrial source of copper. It is recognized by its characteristic brassy yellow color and metallic luster, often accompanied by colorful iridescent tarnish. It crystallizes from hydrothermal fluids, often in association with pyrite, bornite, and other sulfides, and is found in vein systems, skarn deposits, porphyry copper systems, and VMS (volcanogenic massive sulfide) settings. Chemically stable, it generally does not display significant natural radioactivity, although trace concentrations of uranium and thorium may occur in complex mineralized systems.

Pink Jasper

Pink jasper is a variety of microcrystalline chalcedony, itself a cryptocrystalline form of quartz. Its pink coloration results from finely dispersed iron oxides such as hematite. Jasper forms in sedimentary or volcanosedimentary environments, where silica precipitates from colloidal solutions, often in the presence of organic material or metallic oxides. Structurally compact with a conchoidal fracture and dull luster, it is composed almost entirely of silicon dioxide (SiO_2) and presents negligible levels of natural radioactivity.

Tiger's Eye Quartz

Tiger's eye is a fibrous variety of quartz known for its chatoyancy—a silky, banded appearance caused by the pseudomorphic replacement of crocidolite (an iron-rich amphibole) by silica. Its golden and brown bands result from finely intergrown iron oxides. This mineral forms in metamorphic-hydrothermal environments where silica-rich, oxidizing fluids alter iron-bearing rocks. Chemically dominated by SiO_2 with minor iron, it does not present significant natural radioactivity, although the original crocidolite precursor may contain trace radioactive elements.

Rhyolitic Ignimbrite

Rhyolitic ignimbrites are volcanic pyroclastic rocks formed by the deposition of pyroclastic flows (nueés ardentes) during explosive eruptions of rhyolitic magmas. They are composed of glass shards, quartz and feldspar crystals, and sometimes pumice and welded fiamme. Geochemically, they are highly silicic (>70% SiO_2) and often enriched in naturally radioactive elements such as uranium, thorium, and potassium-40. These rocks are commonly associated with large calderas and silicic volcanic fields, and are among the primary geologic sources of radiometric anomalies in volcanic terrains.

Diorite

Diorite is an intermediate intrusive igneous rock with a medium-grained holocrystalline texture. It is mainly composed of plagioclase (andesine), amphiboles, biotite, and minor quartz. It forms by slow cooling of intermediate magmas in the deep crust, typically in subduction-related settings. Chemically, it contains moderate silica levels (55-65%), with variable amounts of Al, Fe, Mg, Ca, Na, and K. Diorite exhibits moderate natural radioactivity due to the presence of potassium-bearing feldspars and micas, which may contain potassium-40.

Megabreccia

The term megabreccia refers to a clastic rock composed of large, angular rock fragments (often exceeding 1 meter in size) embedded in a finer matrix. It forms during high-energy geological events such as submarine landslides, caldera collapse, tectonic faulting, or meteorite impacts. Its chemical composition depends on the lithologies of the included clasts. Some megabreccias may contain radioactive fragments, especially if derived from granitic, volcanic, or mineralized rocks. For this reason, they may display variable and locally elevated natural radioactivity.

Pitchblende

Pitchblende is a massive variety of uraninite, a mineral composed primarily of uranium dioxide (UO_2), often with mixed uranium and lead oxides (U_3O_8, PbO). It precipitates from hydrothermal fluids rich in uranium, typically in vein deposits or reducing sedimentary basins. Black and dense, it is strongly radioactive and represents the main natural source of uranium. Historically, pitchblende has been essential for uranium extraction and nuclear fuel production. Due to its high radioactivity, it is particularly useful for calibrating and testing gamma radiation detectors.

UV Lamp

The RockyBox kit also includes a handheld UV inspection lamp, providing an additional method for the qualitative investigation of the rock samples supplied with the kit. While the Geiger-Müller detector measures the level of ionizing radiation emitted by a sample, the UV lamp allows users to visually identify the presence of fluorescent minerals associated with uranium-bearing compounds.

The lamp emits long-wave ultraviolet (UVA) radiation with a wavelength of 395 nm, which is particularly effective for exciting uranium-containing minerals. When exposed to this wavelength, certain uranium compounds exhibit a characteristic fluorescence, typically appearing as a bright green or yellow-green glow. This optical phenomenon provides a simple and immediate visual indication of the presence of uranium minerals in a sample.

Ultraviolet light is widely used in geology and mineralogy to reveal fluorescent minerals and compounds that are not visible under ordinary illumination. It therefore complements the radiation measurements performed with RockyRAD, enabling users to correlate optical fluorescence with radioactive emissions.

It is important to note that thorium itself does not produce visible fluorescence under UV illumination. When thorium-rich rocks—such as certain granites, pegmatites, or monazite-bearing rocks—appear fluorescent, the emission is generally caused by trace amounts of uranium ions incorporated into the mineral structure or by fluorescence induced by defects in the crystal lattice resulting from long-term radioactive decay.
It should also be emphasized that fluorescence alone is not a reliable indicator of radioactivity. Many non-radioactive minerals—such as fluorite, calcite, scheelite, willemite, and various feldspars—can also fluoresce under UV illumination due to the presence of activator elements or structural defects within their crystal lattice. For this reason, UV fluorescence should always be interpreted together with the radiation measurements provided by RockyRAD.
The UV lamp is intended as a complementary educational tool and should not be considered a quantitative method for identifying radioactive materials. Instead, it provides an engaging visual demonstration that, together with RockyRAD measurements, helps users better understand the relationship between mineral composition, fluorescence, and natural radioactivity.

UV Lamp

Parameter	Specification
Light Source	UV LED
Optical Power	3 W
UV Wavelength	395 nm (UVA)
UV Spectrum	Long-wave ultraviolet (UVA)
Adjustable Arm	Flexible gooseneck for positioning
Power Supply	5 V DC via USB
Operating Mode	ON/OFF switch

UV Lamp – Technical Specifications

Ordering Options

Ordering Code	Description
WSPROCKSXAAA	SPROCKS - RockyBox Additional Rock kit