**Martian Rocks and Minerals**

Neither rocks nor minerals have been collected and returned from the surface of Mars. Our knowledge of its surficial composition is limited to Martian meteorites and geochemical analysis or rocks and minerals by spacecraft on the surface of Mars. The rocks and minerals displayed are believed to be the most common at this time.

1. **Sulfur (mineral)**

On Mars, sulfur has not been identified in its native form and is instead a component of Martian soil and minerals. The soil on mars contains between 5 and 15 wt% sulfur. Minerals containing sulfur, such as gypsum, have also been identified on the Martian surface. These minerals are important to the geologic history of mars as they indicate the presence of liquid water on the surface. Although native sulfur has not been identified on mars, its history of volcanism increased the likelihood of its existence.

1. **Hematite (mineral)**

Hematite is one of the dominant components of the Martian soil. Hematite has not been identified as a primary mineral component within Martian rocks. It has been found as a secondary alteration mineral both within the weathering rind of rocks and also replacing primary minerals within rocks. Unusual spherical shaped hematite or ‘blueberries’ have also been identified on the Martian surface. They are about 4 mm in diameter and were identified in a Martian sedimentary sandstone by the Mars rover, Opportunity. Scientist believe iron and sulfate rich fluids moving through the sandstone chemical precipitate the blueberries within the rock. The identification of hematite on the surface of mars is important because it suggests the presence of water at the surface at some time during the planet’s history.

1. **Gypsum (mineral)**

On mars gypsum is a common component of the layered sedimentary deposits in the north and south poles as well as those found within canyons. A European satellite, OMEGA identified gypsum in Valles Marineris and within the layered deposits of the north pole. Mars rover, Opportunity, identified several evaporitic minerals including gypsum at its landing site in 2004. Gypsum fragments have also been identified within deposits on the Martian surface is important to reconstructing its geologic history. Evaporates indicate large bodies of water were once present on Mars and that they underwent period of evaporation to allow for evaporitic deposition.

1. **Vesicular Basalt (rock)**

Basalts are the most common material found on the Martian surface. On Mars, basalts compose the several shield volcanoes of the Tharsis bulge as well as the extensive lava plains on the surface.

1. **Arenite (sandstone) (rock)**

Arenites found on mars are much different than those found n earth. On earth, quartz is a common mineral component of igneous rocks; however, quartz-rich igneous rocks have not been identified on the Martian surface. The most common igneous rock on Mars is basalt, whose common mineral components are plagioclase, olivine, and pyroxene. Since basalt is the most common rock exposed on the Martian surface, arenites likely have a basaltic composition. Like earth, both water and wind generated arenites exist on the Martian surface as identified by mars rover, Opportunity at its landing site.

1. **Breccia (rock)**

Martian breccias are dominantly formed as a result of meteor impacts, although extrusive volcanic breccias also exist. Martian impact breccias form when an extraterrestrial rock impacts the surface of Mars and the rocks on the surface undergo fragmentation. These fragments, or clasts, are ejected from the newly formed crater and consolidates during or after the impact. Clasts within Martian breccias are composed of rock fragments. Since Mars’ surface is dominantly composed of oxidized basalts, impacts on its surface has resulted in the formation of basaltic breccias.