Andesite Encyclopedia Article

Andesite

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Andesite

Andesite is the most common volcanic **rock** after **basalt**. It is porphyritic, that is, consists of coarse **crystals** (phenocrysts) embedded in a granular or glassy matrix (groundmass). Having a silica content of 57%, it is in the intermediate category (52–66% silica) of the silicic–mafic scale. The large volcanic **mountain chains** of North and **South America**, including the Andes (for which andesite is named), are composed largely of andesite. Indeed, andesite is common in all the mountain-building zones that rim the Pacific Ocean. The transition from the oceanic **crust** of the main basin of the Pacific to the andesitic rocks around its perimeter is termed the andesite line. The crust on the deep-sea side of the andesite line is a product of **sea-floor spreading**, and the andesitic mountains on the other side are a product of orogenic volcanism. The andesite line thus marks the geological border of the true Pacific basin.

The primary ingredient of most andesites is andesine, a **feldspar** of the **plagioclase** series. Smaller amounts of **quartz** or **minerals** rich in **iron** and magnesium such as **olivine**, pyroxene, biotite, or hornblende are also present. Andesites are ordered in three classes according to the identity of their non-feldspar components: from most **silicic** to most **mafic**, these are (1) quartz-bearing andesites, (2) pyroxene andesites, and (3) biotite and hornblende andesites. All are intermediate in composition between diorite (an intrusive igneous rock consisting mostly of plagioclase feldspar) and **rhyolite**, a volcanic rock having the same composition as **granite** (i.e., feldspar plus quartz). In other words, andesites are higher in feldspar than rhyolite but lower in feldspar than diorites.

Andesite's character usually results from the **melting** and assimilation of rock fragments by **magma** rising to the surface. Rocks nearer the surface tend to be higher in **silicon**, because silicon is less dense than iron and magnesium, components that increase at greater depths. An andesite can thus be viewed very roughly as a basalt contaminated with excess silicon (and perhaps other ingredients). Indeed, many olivine-bearing andesites are so close to basalt in appearance that they can only be distinguished on the strength of chemical analysis.

Andesites high in quartz—dacites—are sometimes classed as a separate group.

Mount St. Helens erupted explosively because its magma is andesitic, with increased amounts of trapped gas. AP/Wide World. ***Reproduced by permission.***

See Also

Bowen's Reaction Series; Crust; Earth, Interior Structure; Minerals; Volcanic Eruptions