BSc (IV) semester

Lecture Notes (Prof. S. Sensarma)

Brief Description of common metamorphic rocks

Slate is aphanitic (fine-grained), has a dull luster and well developed slaty cleavage. It is mostly metamorphosed from shale (a common sedimentary rock) under low-grade metamorphic condition. Slate can retain relict grading/bedding and other primary sedimentary features. Even though clay minerals in shale have recrystallized to chlorites and micas, the angular outlines of the original quartz grains may still be evident in typically low-grade slates.

Phyllite is an overall fine-grained metamorphic rock. However, because of a slightly coarser grain size than slate, phyllite has a lustrous or silky sheen on foliation surfaces. Phyllites are transitional between slates and schists and share associations and properties of both.

Schists are phaneritic, commonly porphyroblastic rock, and have a weak to better developed layering of felsic and mafic minerals that usually arranged in a preferred direction imparting schistosity (a type of foliation) to the rock. Lineation may commonly be expressed by elongate segregations of contrasting minerals on the foliation surface. In comparison to slates and phyllites, schists are coarse- grained and have better developed metamorphic fabric. Mica + chlorite + quartz are common minerals.

In **gneiss** major minerals include quartz and feldspar (which are more equant), and mica, chlorite, amphilbole. Gneissosity (a type of foliation) is expressed by sparse or imperfectly aligned platy minerals (e.g., mica, chlorite) in alternate bands with felsic minerals (quartz+ feldspar). Gneiss forms at a higher grade of metamorphism.

Quartzite forms by recrystallization of relatively pure quartz sandstones. It may contain quartz (>90-95%) ± feldspar ± mica. In quartzites, effects of recrystallization may erase the

clastic texture (sedimentary texture) and give rise to a granoblastic texture (no-foliated). Quartz grains in some quartzites may be somewhat strained with sutured margins (see Fig. 6c) resulting from deformation and dynamic recrystallization

Migmatite is a composite, heterogeneous rock (*migma* means mixture) on the outcrop scale that consists of mafic metamorphic rock mingled with felsic rock in the form of planar to folded and contorted layers, criss-crossing veins, and irregular pods. There may be no sharp distinction between quartzo-feldspathic gneiss and migmatite, hence labels such as migmatitic gneiss and gneissic migmatite are frequently used. In many migmatites, the leucocratic (light coloured) leucosome is separated from paleosome, by a more mafic selvage, or melanosome.

Mylonite is a sheet-like, laminated body of fine-grained rock developed in high-strain zone of ductile deformation.

Amphibolite is a coarse grained rock made of plagioclase and hornblende. Depending on grade and bulk chemical composition, garnet and pyroxene may also occur. Subordinate minerals include biotite, titanite, Fe–Ti oxides, and quartz. Amphibolite may be foliated (e.g. schistose amphibolites) or massive (non-foliated) with granoblastic texture.

Metamorphism of relatively pure limestone and dolomite produce generally coarse-grained **marble and dolomite marble**, respectively. Marble generally have granobastic texture (non-foliated).

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