Appendix U.6.5 – Mohs Scratch Hardness

Generic Name of Test	*Sliding* Mineral Scratchers : Abrasion Test
Principle of Test	Loaded mineral crystal slides over specimen
Historic Development of Test	In 1824 Mohs, a German mineralogist numbered a range of minerals of increasing hardness from 1 to 10 such that the harder material was a minimum of 1.2 times harder than the preceding soft mineral on the scale and thereby able to scratch it [Hutchings (1992)]. (The method of assessing surface hardness, known as the "Mohs value" is described in European Standard EN 101).
Apparatus and Abrasives	Ten minerals are required: talc, gypsum, calcite, fluorite, apatite, orthoclase, quartz, topaz, corundum and diamond. These correspond to Mohs hardness values of 1 through 10.

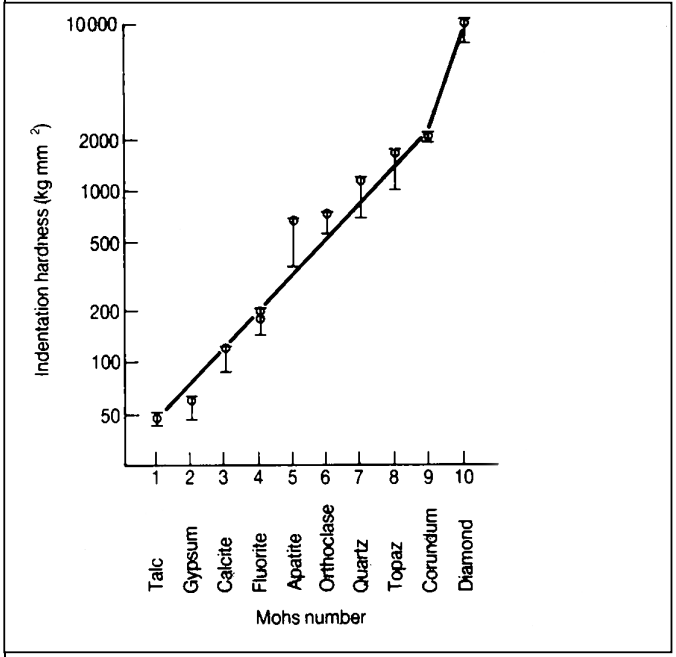

Figure U.6.5.1 The various standard minerals classified in the Mohs scale (increasing in hardness from left to right) [Hutchings (1992)]

Test Method	While applying constant pressure, a sharp corner of a crystal of one of the ten standard minerals in the Mohs scale is drawn over the surface of the test specimen. If the surface of the test specimen is not scratched, then the test is repeated using the next hardest mineral in the Mohs scale.
Abrasion Wear	The number of the hardest mineral that will not scratch the test surface is referred to as the Mohs value.
References	Author — Comment Hutchings (1992) — Source document

APPENDIX U.6.5

Wear Mechanisms according to Author

(i) Hutchings (1992): plastic scratching will only occur if the hardness of one material (H_a) is greater than 1.2 times the hardness of the surface being scratched (H_s). In the case of Mohs scale, each mineral is on average approximately 1.6 times harder than the previous mineral.

(ii) Visual effects:

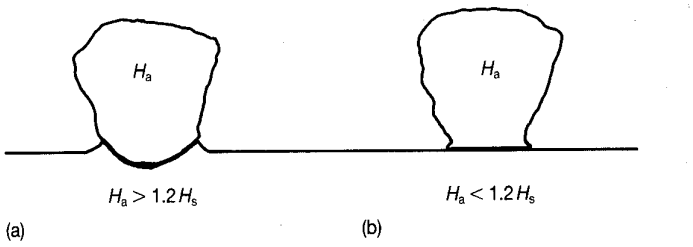

Figure U.6.5.2 Contact between two minerals: a) plastic scratching takes place $H_a > 1.2H_s$ b) scratching does not occur $H_a < 1.2H_s$

Wear Mechanisms according to writer [R3 S3 I0]

(i) Sliding: Depending on the hardness of the mineral crystal being used to make a scratch, as well as the applied pressure, three possible modes of wear are possible.

- If H_a is softer than 1.2 H_s: No scratches
- If H_a is harder than $1.2H_s$ and a light pressure is applied, asperities in the line of the scratch will be sheared off.
- If H_a is harder than $1.2H_s$ and a substantial force is applied, then lateral cracks are likely to appear, similar to that of figure 3.19 in volume 2.