## The hardness scale introduced by Friederich Mohs

The hardness of any object is determined by the strength of chemical bonds between the constituent atoms. The hardness of a material is measured by the ease or difficulty with which it can be scratched.

Diamond is the hardest mineral, because it can scratch all other materials. The hardness assigned to diamond is 10.0. Talc is one of the softest; almost any other mineral can scratch it. The hardness assigned to talc is 1.0.

A mineral's hardness can be measured by comparing it to the hardnesses of a standardized set of minerals first established by **Friederich Mohs** in the early 19th century. The **Mohs Hardness Scale** is a relative scale which means that a mineral will scratch any substance lower on the scale and will be scratched by any substance higher on the scale.

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|---|---|---|
| **Talc** | **1.0** | |
| **Gypsum** | **2.0** | |
| Gold (Au) | 2.2 | |
| Fingernail | 2.0 – 2.4 | |
| Silver (Ag) | 2.4 | |
| Ivory | 2.5 | |
| **Calcite** | **3.0** | |
| Copper (Cu) | 3.0 | |
| **Fluorite** | **4.0** | |
| Platinum (Pt) | 4.0 | |
| **Apatite** | **5.0** | |
| GaAs | 5.0 – 5.5 | |
| Steel | 5.0 – 5.5 | |
| Glass plate | 5.0 – 6.0 | |
| **Orthoclase** | **6.0** | |
| Tungsten (W) | 6.0 | |
| Titanium (Ti) | 6.5 | |
| Zirconia ($ZrO_2$) | 6.5 | |
| **Quartz (crystalline $SiO_2$)** | **7.0** | |
| Silicon (Si) | 7.0 | (CRC Handbook of Chemistry and Physics) |
| Aluminum nitride (AlN) | 7.0 | (www.edgepolishing.com) |
| Streak plate | 7.5 | |
| Garnet | 7.0 – 7.5 | |
| **Topaz** | **8.0** | |
| Chromium (Cr) | 8.0 | |
| Silicon nitride ($Si_3N_4$) | 8.0 – 9.0 | (http://www.ceradyne.com/mtsi3n4.htm) |
| **Carborundum (mostly SiC)** | **9.0** | |
| Sapphire ($Al_2O_3$) | 9.0 | |
| Tungsten carbide | 9.0 | |
| Titanium nitride (TiN) | 9.0 | (CRC Handbook of Chemistry and Physics) |
| Silicon carbide (SiC) | 9.2 – 9.5 | |
| **Diamond (C)** | **10.0** | |

*Note*: The materials and hardnesses typed in **bold face** were originally introduced by Friedrich Mohs.