

## Determination of mineral hardness based on its physical properties

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**Abstract:** Hardness of a mineral is one of its important physical properties and several methods have been presented for its determination. Mohs hardness determination is the most versatile method by which the mineral hardness is determined somewhat qualitatively with respect to another mineral and has no unit. In this paper, because of the need to measure the mineral hardness more accurately and give a meaningful unit to it, a new method is proposed to determine the mineral hardness based on its other related physical properties. In the proposed method the coefficient of friction is taken as the base, where the effects of other related factors like temperature, normal force, surface hardness, velocity and its direction are considered and then the direct and inverse relations of these factors on the coefficient of friction are discussed. The new method (which is called as FH (Frictional Hardness) method) is also compared with the three existing methods i.e. Mohs hardness, Rockwell hardness (R) and Penetration hardness (p). The main advantages of the FH method are: (i) Hardness has a specific unit and dimension, (ii) The hardness of different minerals can be determined accurately so that they can be distinguished from each other in a better way, and (iii) A lot of minerals in which their hardness are very close to each other will not have equal hardness. Maximum temperature which is an important factor in FH hardness can be obtained through equations of heat and energy or it can be measured by a thermocouple.

**Keywords:** *Hardness, Coefficient of Friction, Maximum Temperature, Velocity Vector.*