

HARDNESS

WHAT IS HARDNESS?

fracture, dependent, measure, behaviour, scales, sharp, subject, load, change, testing, harder, procedures, deform, compression, height

Often materials are _____ to forces (loads) when they are used. Mechanical engineers calculate those forces and material scientists how materials _____ (elongate, compress, and twist) or break as a function of applied _____, time, temperature, and other conditions.

Materials scientists learn about these mechanical properties by _____ materials. Results from the tests depend on the size and shape of material to be tested (specimen), how it is held, and the way of performing the test. That is why we use common _____, or standards, which are published by the ASTM (American Society for Testing and Materials).

Hardness is a _____ of how resistant solid matter is to various kinds of permanent shape _____ when a compressive force is applied. Some materials, such as metal, are _____ than others. Macroscopic hardness is generally characterized by strong intermolecular bonds, but the _____ of solid materials under force is complex; therefore, there are different measurements of hardness: scratch hardness, indentation hardness, and rebound hardness. Scratch hardness is the measure of how resistant a sample is to _____ or permanent plastic deformation due to friction from a _____ object. The principle is that an object made of a harder material will scratch an object made of a softer material. Indentation hardness measures the resistance of a sample to material deformation due to a constant _____ load from a sharp object. Rebound hardness, also known as dynamic hardness, measures the _____ of the "bounce" of a diamond-tipped hammer dropped from a fixed height onto a material. This type of hardness is related to elasticity. Within each of these classes of measurement there are individual measurement _____. For practical reasons conversion tables are used to convert between one scale and another.

Hardness is _____ on ductility, elastic stiffness, plasticity, strain, strength, toughness, viscoelasticity, and viscosity. Common examples of hard matter are ceramics, concrete, certain metals, and superhard materials, which can be contrasted with soft matter.