

Episode 226: Preparation for Materials Topic

Our use of materials characterises our history (Stone Age, Iron Age, etc.) and new developments in materials science influence our lives greatly. Here we focus on some important mechanical properties of materials.

This topic provides a good opportunity for calculations using scientific notation as well as unit conversions (e.g. mm^2 to m^2). It is an excellent area to stimulate project work – many useful measurement techniques can be noted.

Episode 227: Hooke's law

Episode 228: The Young modulus

Episode 229: Stress-strain graphs

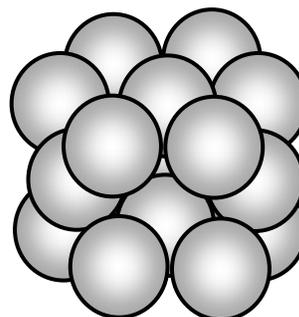
Advance warning

Many university materials science departments are happy to provide access to their facilities to give students the experience of using 'real' equipment, such as tensile testing machines (to measure the Young modulus), and microscopes. Contacts may be made through the Institute of Materials, Minerals and Mining (IoM3) www.iom3.org.uk. The Institute also provides resources (including speakers) and has a schools' affiliation scheme.

Main aims

Students will:

1. Interpret stress-strain graphs.
2. Measure the Young modulus of a selection of materials.
3. Solve problems involving the Young modulus.
4. Compare materials by comparing their stress-strain graphs.



(resourcefulphysics.org)

Prior knowledge

Students are likely to have studied Hooke's Law. They may also have a broad knowledge of terms which describe materials (stiff, strong, brittle etc.) as well as knowing about different classes of materials (metals, polymers, ceramics...).

It will be helpful if they have learned to use vernier scales and micrometer screw gauges, but they can also learn about them in this topic. (A useful Java applet for the vernier scale is at <http://www.phy.ntnu.edu.tw/java/ruler/vernier.html> and was available in August 2005)

TAP 228-6: Measure for measure

Where this leads

This topic could lead into a discussion of other important aspects of materials – electrical, thermal, optical, magnetic and other properties.

For students with an interest in both Chemistry and Physics, Materials Science could provide an interesting career path.