C3-3: Physical Properties of Solid Materials

Apparatus

A large selection of different solid materials; 1.5V cell; ammeter (0–1A); voltmeter (0–3V); 5 connecting leads; magnet; compass needle; triple beam balance; overflow can; 1L and 100ml measuring cylinders filled with water; small beaker; optical pin; 0.5m ruler; Physics reference books; eye protection glasses.

PRECAUTIONS

1. Some materials shatter if stressed. Take care to protect your eyes!
2. Do not damage samples in the box marked 'DO NOT DAMAGE.' Any other materials can be bent or damaged if you wish.

Procedure

1. Choose 8 different materials for testing. For each of the materials, perform the following tests. Tabulate the results in a large table. Use words and/or numbers in the table, do not just use ✓ or ×.
2. Name the material. Describe its molecular structure, giving the constituent elements.
3. Find its **density**. Is the material **porous**?
4. Find its **resistance** between two chosen points (in Ω).
5. When illuminated with white light:
    a. What **intensity** and **colors** of light are **reflected**?
    b. What intensity and colors of light are **transmitted**?

c. Is it **opaque**, **translucent**, or **transparent**?

d. Is the reflection **regular** or **diffuse**?

6. Is the material a good or poor **thermal conductor**?
7. Are there **ferromagnetic** elements in the material?
8. Mechanical tests: (approximate only)
    a. **Elasticity**: is it a **stiff** material?
    b. **Strength**: is the material **strong** or **weak**?
    c. **Hardness**: is the material **hard** or **soft**?
    d. Is the material **ductile** or **brittle**?

NOTE: The **bolded** words in sections 3 to 8 have exact meanings in Physics. Make sure that you know these meanings (refer to text books for help).

Observations

Tabulate your observations for each of 8 selected materials.