

Nova's Material Science Exploration

Learning objective: To identify, describe, and compare the properties of everyday materials and understand their suitability for specific purposes.

Read each flashcard carefully. Use the front to test your knowledge of material properties and check the back for the scientific explanation. Think about why Nova the owl chooses specific materials for her stargazing equipment!

What is the difference between a thermal conductor and a thermal insulator?

A thermal conductor allows heat to pass through it easily, like a metal spoon, while a thermal insulator slows down or prevents the transfer of heat, like a woollen scarf.

If a material is described as 'opaque', what does that mean?

It means the material does not allow any light to pass through it, so you cannot see objects on the other side.

Nova wants to build a telescope tube. Should she choose a transparent or an opaque material for the casing? Justify your answer.

She should choose an opaque material to prevent stray light from entering the tube, which would interfere with the clarity of the stars she is observing.

Define 'solubility' in the context of materials.

Solubility is the measure of how easily a substance (the solute) can dissolve in a liquid (the solvent), such as salt dissolving in water.

Why is 'flexibility' an important property for a garden hose?

Flexibility allows the hose to be coiled for storage and bent around corners without snapping or cracking under pressure.

Explain why metals are generally considered 'hard' materials.

Hardness refers to a material's resistance to surface damage, such as scratching, denting, or bending. Metals have a strong internal structure that resists these forces.

What might happen if you made a raincoat out of a permeable material?

A permeable material allows liquids or gases to pass through it, so the wearer would get wet because the rain would soak through the fabric.

Compare and contrast 'rigid' and 'flexible' materials. Give one example of each.

A rigid material, like a wooden block, keeps its shape and resists bending. A flexible material, like a rubber band, can be bent or stretched without breaking. Contrast: one resists shape change, the other accommodates it.

If a material has high density, what does that imply about its particles?

A high-density material has particles that are packed very closely together, often making the object feel heavy for its size.

Justify why plastic is often used to coat electrical wires.

Plastic is an electrical insulator, meaning it does not allow electricity to flow through it. This protects the user from coming into contact with the live current inside the wire.