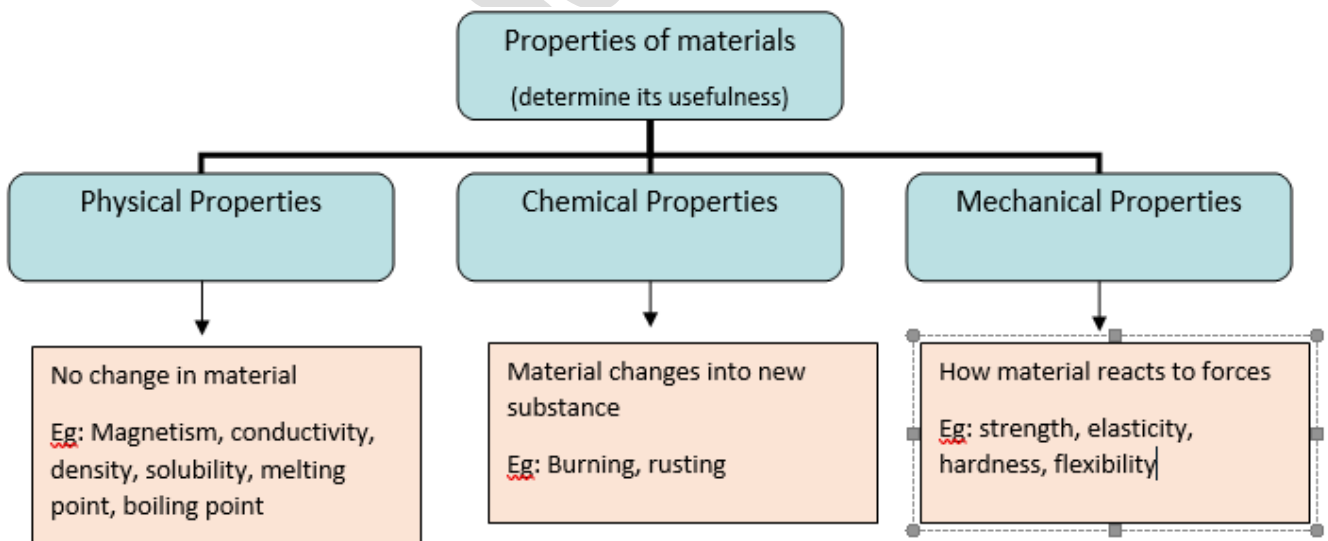


Chapter 2.2: Materials and Their Properties - Answers

Vocabulary List!

1. **Physical Property** - the characteristic that can be observed or measured without changing the identity of the material.
2. **Chemical Property** – is the ability or inability of a substance to combine with or change into one or more new substances.
3. **Mechanical Property** – are characteristics that determine how a material reacts to forces.
4. **Polymers** – are natural or manufactured materials composed of long chains of small, repeating molecules called monomers.
5. **Composite Material** – is a mixture of two or more materials – one layered in the other.
6. **Alloy** – is a mixture of two or more metals.

Mind Map



Type of Materials: Engineers use different types of materials to manufacture products. These materials are classified by how they originated.

Materials are classified as Wood, Polymers, Plastics, Composites, Alloys, Ceramics

Reading Check (pg 42)

1. Name additional physical properties that should be considered when evaluating materials.

Answer: Shape, color, size, magnetism

Visual Check (pg 43)

2. Which mechanical property describes a materials ability to withstand a force such as compression?

Answer: Strength

Reading Check (pg 44)

3. Why are there so many types of polymers?

Answer: Changing the number, type and position of the monomer in a polymer, changes the properties of the polymer. Such changes can result in a large number of different polymers with unique set of chemical and physical properties.

Key Concept Check (pg 45)

4. Why would automobile manufactures want to use composite materials instead of metal for automobile bodies?

Answer: Using a composite material for the automobile body would make the car lighter and rust resistant.

Key Concept Check (pg 45)

5. What are possible advantages of an alloy over a pure metal?

Answer: Alloys have improved properties than metals. Alloys have better hardness, strength, density, durability or corrosion resistance.

Reading Check (pg 46)

6. How are ceramics and alloys similar?

Answer: Ceramics and alloys are both mixtures designed to produce desired properties.

Summarize it! (Page 47)

1. How are materials selected for a designed product?

Answer: Materials are selected based on their physical, chemical and mechanical properties.

2. Why are materials modified to change their properties?

Answer: Materials are modified so that their unique properties makes it more useful in wide range of applications.

3. How are materials classified?

Answer: Materials are classified based on their unique properties into wood, polymers, plastics, composites, alloys and ceramics.

Use Vocabulary (Page 48)

1. A(n) mechanical property is a characteristic that determines how a material reacts to forces.

2. **Define alloy** in your own words.

Answer: Alloys are mixtures of two or more metals.

3. **Use the term physical property** in a complete sentence.

Answer: Physical property is a characteristic that can be observed or measured without changing identity of the material.

Understand Key Concepts

4. Which does NOT have modified properties?

Answer: C. Metals

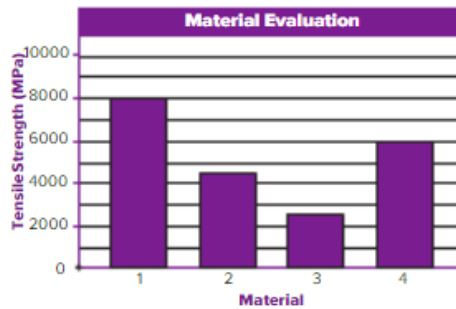
5. **Explain** how you would classify a material that contains a mixture of three metals

Answer:

The mixture of three metals would be classified as an alloy because an alloy is a mixture of 2 or more metals.

Interpret Graphics

6. **Analyze** Tensile strength is a measure of the amount of pulling stress an object can withstand before it breaks. Using the graph, which material should be considered for product that must have the highest tensile strength?



Answer: Material 1

7. **Summarize Information** Copy the graphic organizer below to give examples of the various properties used to select materials.

Properties	Examples
Physical Properties	Conductivity, Density, Melting Point, Solubility
Chemical Properties	Burning, Rusting
Mechanical Properties	Strength, Elasticity, Hardness, Flexibility

Critical Thinking

8. If you were designing a skyscraper in an earthquake zone, what properties would the building materials need?

Answer: The materials would need the strength to support the weight of the structure and flexibility to withstand the forces generated by earthquake