Name: _____ Class: _____ Date: _____

Wood, modified wood, ceramics, metals and alloys

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CONCEPT REVIEW 50

Complete this concept review handout and keep it as a record of what you have learned.

Definitions

- Wood is *a material obtained by harvesting and processing trees.*
- Modified wood is *treated wood or a material made from wood mixed with other substances.*
- A ceramic is *a solid material obtained by heating inorganic matter containing various compounds, usually oxides.*
- A metal is *a material extracted from a mineral ore. Metals are usually shiny in appearance and are good conductors of electricity and heat.*
- An alloy is *a mixture of a metal with one or more other substances, which may be metallic or nonmetallic.*
- Steel heat treatments are *methods of enhancing certain mechanical properties of steel through periods of heating.*

Wood and modified wood

Properties

- *Hardness*
- *Elasticity*
- *Resilience*
- *Toughness*
- *Low thermal and electrical conductivity*
- *Ease with which it can be shaped and assembled*
- *Colours and shades*
- *Lightness*

Degradation and protection

Examples of causes of degradation:

Many fungi, microorganisms and insects can infest the wood, feed off it and cause it to rot.

Examples of means of protection:

It can be varnished, painted or treated with protective coatings. It can be treated by dipping it in an alkaline solution containing copper or by heating it to a high temperature.

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Ceramics

Properties

- *Low electrical conductivity*
- *Low thermal conductivity*
- *High degree of hardness*
- *Corrosion resistance*
- *Heat resistance*
- *Resilience*

Degradation and protection

Examples of causes of degradation:

The action of certain acids and bases.

Thermal shocks.

Examples of means of protection:

Exposure to acids, bases or thermal shocks should be avoided.

Metals and alloys

Properties

- *Good thermal and electrical conductivity*
- *Malleability*
- *Ductility*

Degradation and protection

Examples of causes of degradation:

Oxidation causing corrosion.

Examples of means of protection:

Coatings.

Heat treatments: quench hardening and tempering, annealing.

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INTEGRATION QUESTIONS

Wood, modified wood, ceramics, metals and alloys

1. You are thinking of building a wooden deck. You look at your neighbour's deck and see that it is discoloured and rotten in certain places.

   a) How can you explain the state of your neighbour's deck?

   Answers will vary. Examples.

   Sun, water, time, fungi, microorganisms and insects have degraded the wood, which is a material of living origin. The neighbours did not treat the wood to protect it from this degradation.

   b) How could you prevent your deck from suffering the same fate?

   By using treated wood or protecting the wood with varnish, paint or a protective coating.

   c) Your renovation consultant recommends using green treated wood. What protection process has been used for this wood?

   The greenish colour results from dipping it in an alkaline solution containing copper.

2. What am I? Associate each of the following statements with the appropriate material.

   a) I have been produced from a mineral ore in the ground. — *Metal.*

   b) I am chosen for my good thermal and electrical conductivity, my ductility and my malleability. — *Metal.*

   c) I am fragile, but by carefully controlling the raw materials used and the baking method, I can even be used in an engine. — *Ceramic.*

   d) I can be used to make fences. — *Treated wood or an alloy.*

   e) I am an alloy made primarily from iron and carbon. — *Ferrous alloy or steel.*

   f) Because of my low thermal conductivity, I often serve as a thermal insulator. — *Ceramic.*

   g) I am made, among other things, from wood residues. — *Modified wood.*

   h) I am a natural material found on the Earth's surface. — *Wood.*

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3. Why is it better to have a ceramic floor in a kitchen or bathroom than a wooden floor?

Answers will vary. Examples. Ceramic is more water-resistant than wood. Spills will not damage it. Furthermore, the relative hardness of ceramic makes it more resistant than wood to cuts and impacts caused by pots and other objects falling on the floor.

4. When steel parts are welded together, the material's mechanical properties are often altered in the area where the weld has been made. What is the name of the heat treatment that restores the parts' mechanical properties?

Annealing.

5. To construct a building's steel framework, engineers must ensure that the alloy is highly resistant. What treatments can make steel harder?

Quench hardening and tempering.

6. Today, patio furniture is often made of coated aluminum rather than wood.

a) Name an advantage in using aluminum rather than wood for outdoor furniture.

Coated aluminum resists degradation caused by water, sun and living organisms better than wood.

b) What property explains why an aluminum chair in the sun will be hotter to the touch than a wooden one in the same spot?

Thermal conductivity.

7. True or false?

a) Alloys and ceramics are mixtures. *True.*

b) Metal is often used for its elasticity. *False.*

c) Certain acids stored in ceramic containers will deteriorate the containers. *True.*

d) Metals have better electrical conductivity than wood or ceramic. *True.*

e) Wood conducts electricity well. *False.*

8. Name a possible cause for the degradation of materials in the following situations.

a) A ceramic bowl of ice cubes is placed on a very hot heating plate. *Thermal shock.*

b) A hammer is left out in the snow *Snow accelerates the corrosion.*