Dental Materials 3rd edition Hatrick Test Bank

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Chapter 02: Oral Environment and Patient Considerations

MULTIPLE CHOICE

1. Some dental materials may be therapeutic in small quantities or if in contact with tissues for a short period of time. Dental materials may be irritating or toxic with longer or larger doses.
   a. Both statements are true.
   b. Both statements are false.
   c. The first statement is true, and the second statement is false.
   d. The first statement is false, and the second statement is true.

   ANS: A
   Some dental materials may be therapeutic in small quantities or if in contact with tissues for a short period of time but also may be irritating or toxic with longer or larger doses. Topical fluoride is of great benefit when used according to manufacturers' directions but can be irritating to soft tissues and can even excessively etch enamel if used improperly.

   REF: p. 9 TOP: Biocompatibility

2. Normal masticatory forces on the occlusal surfaces of molar teeth can increase to as much as _____ pounds per square inch on a cusp tip.
   a. 280
   b. 1000
   c. 10,000
   d. 28,000

   ANS: D
   Normal masticatory forces on the occlusal surfaces of molar teeth can increase to as much as 28,000 pounds per square inch on a cusp tip. Normal masticatory forces on the occlusal surfaces of molar teeth average 90 to 200 pounds. Masticatory forces decrease in incisor areas and can increase during bruxing or clenching.

   REF: p. 10 TOP: Force and Stress

3. _____ force is applied when two surfaces slide against each other in opposite directions.
   a. Compressive
   b. Shearing
   c. Tensile
   d. Axial

   ANS: B
   Shearing force is applied when two surfaces slide against each other or in a twisting or rotating motion. An incisor used for cutting is an example of shearing forces.

   REF: p. 10 TOP: Force and Stress

4. Stress is the amount of force exerted from within an object, and _____ is the amount of change that the force has produced.
   a. strain
   b. tension

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c. compression
d. chemical bonding

ANS: C
Stress is the amount of force exerted from within an object, and strain is the amount of change that the force has produced. The normal process of chewing rarely involves only one type of stress; these combinations of stresses form complex stress combinations.

REF: p. 11 TOP: Force and Stress

5. Which of the following materials has the highest ultimate compressive strength (lbs/in^2)?
a. Acrylic
b. Porcelain
c. Amalgam
d. Composite resins

ANS: C
Amalgam has the highest ultimate compressive strength (45,000 to 64,000 lbs/in^2), followed by composite resins (30,000 to 60,000 lbs/in^2), porcelain (21,000 lbs/in^2), and acrylic (11,000 lbs/in^2). Amalgam and composite resins more closely replicate enamel in compressive strength, but porcelain falls short. Porcelain is more likely to fracture under compressive stresses.

REF: p. 11
TOP: Table 2-1: Ultimate Compressive and Tensile Strengths of Tooth and Restorative Structures

6. Which of the following statements is correct about fatigue failure?
a. It is not a factor for restorative dental materials.
b. It is not dependent on conditions in the oral cavity.
c. It occurs as the result of a large, single-force application.
d. It occurs as the result of microscopic flaws that grow over time.

ANS: B
Fatigue failure occurs as the result of microscopic flaws that grow over time. Failures rarely occur in a single-force application; rather, they occur when stress is frequently repeated. A metal wire will eventually break when bent repeatedly. Restorative materials are subject to repeated fatigue testing for all forces. Conditions of the oral cavity such as humidity and temperature and pH fluctuations may also increase fatigue failure.

REF: p. 11 TOP: Force and Stress

7. The normal resting pH of saliva ranges from 6.2 to _____, which is neutral.
a. 1
b. 6.6
c. 7
d. 14

ANS: C
The normal resting pH of saliva ranges from 6.2 to 7, which is neutral. It can fluctuate higher or lower by several points during the course of a day. Many materials that would be compatible in a neutral environment will not be compatible in an acidic one.

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REF: p. 11 TOP: Moisture and Acid Levels

8. The staining of resins and acrylics from repeated exposure to coffee, tea, and other dyed beverages is due to:
   a. compressive forces.
   b. water sorption.
   c. galvanism.
   d. tarnish.

   ANS: B
   The staining of resins and acrylics from repeated exposure to coffee, tea, and other dyed beverages is due to water sorption. Water sorption is the ability to absorb moisture. Dentures, when placed in a glass of water, will take up the liquid and become slightly larger. Some acrylics will absorb both odors and tastes from foods.

   REF: p. 11 TOP: Moisture and Acid Levels

9. Which of the following dental restorative materials is particularly susceptible to corrosion?
   a. Acrylic
   b. Dental porcelain
   c. Dental amalgam
   d. Composite resin

   ANS: C
   Dental amalgam is particularly susceptible to corrosion, causing marginal breakdown and discoloration of tooth structures. In newer, high-copper amalgams, this may not be as critical to their longevity.

   REF: pp. 11-12 TOP: Moisture and Acid Levels

10. Which of the following has been suggested to delay formation of surface tarnish on dental amalgams?
    a. Incremental addition
    b. Polishing
    c. Use of non–copper-containing dental amalgam
    d. Undercondensation

    ANS: B
    Polishing of amalgams to produce a smooth surface has been recommended to help delay the process of surface tarnish. Surface tarnish, discoloration due to oxidation of the metal's surface, can accelerate in crevices between a tooth and restoration and on rough surfaces.

    REF: p. 12 TOP: Moisture and Acid Levels

11. Which of the following is true of galvanism?
    a. It is an electrical current transmitted between two similar metals.
    b. It is observed in patients with composite resin but not silver amalgam restorations.
    c. Galvanic stimulation will decrease with time as oxides form on the surface of the metal.
    d. The salts of the saliva inhibit the movement of electrical current from one type of metal to another.

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ANS: C
Galvanic stimulation will decrease with time as oxides form on the surface of the metal. Galvanism is an electrical current transmitted between two dissimilar metals. An environment containing moisture, acidity, and dissimilar metals makes the generation of electrical current possible. The salts of the saliva facilitate the movement of electrical current from one type of metal to another. The current may result in stimulation to the pulp, called *galvanic shock.*

REF: p. 12 TOP: Galvanism

12. What could excessive expansion of a restorative material result in?
    a. Corrosion
    b. Galvanism
    c. Fracture of cusps
    d. Leakage of fluid and bacteria into the gaps

ANS: C
Excessive expansion of a restorative material may result in fracture of cusps. Excessive contraction may result in leakage of fluid and bacteria into the open gaps, resulting in sensitivity. Expansion and contraction are measured using the coefficient of thermal expansion, the measurement of change in volume or length in relationship to change in temperature.

REF: p. 12 TOP: Temperature

13. What is percolation?
    a. The rate at which heat flows through a material
    b. A form of chemical rather than mechanical retention
    c. Something that helps seal the interface between tooth and restorative material
    d. Something that allows the ingress of bacteria and oral fluids and may lead to recurrent caries, staining, and pulpal irritation

ANS: D
Percolation allows the ingress of bacteria and oral fluids and may lead to recurrent caries, staining, and pulpal irritation. Percolation is the repeated shrinkage and expansion of the restoration during ingestion of cold and hot fluids, producing the opening and closing of a gap between the restoration and the tooth surface.

REF: p. 12 TOP: Temperature

14. Which of the following is the best thermal conductor?
    a. Gold
    b. Dentin
    c. Enamel
    d. Ceramic

ANS: A
Gold is one of the best thermal conductors; nonmetals such as ceramics, resins, cements, enamel, and dentin are poor conductors. Poor conductors can be used as insulators; dentin is a natural insulator.

REF: p. 12 TOP: Temperature

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15. Which of the following restorative materials has a coefficient of thermal expansion and thermal conductivity closest to enamel?
    a. Gold
    b. Amalgam
    c. Porcelain
    d. Composite resin

    ANS: C
    Porcelain has a coefficient of thermal expansion ($\times 10^{-6}$/°C) of 15 and thermal conductivity (k) ([mcal·cm]/cm sec/°C) of 2.50; enamel has a coefficient of thermal expansion of 11 and thermal conductivity of 2.0. In contrast, the coefficient of thermal expansion of amalgam is 20 to 28, and the thermal conductivity of amalgam is 54, but the coefficient of thermal expansion of composite resin is 26 to 40, and the thermal conductivity of composite resin is 2.60.

    REF: p. 13 TOP: Table 2-2: Thermal Properties of Tooth and Restorative Structures

16. The technique of chemical bonding rather than mechanical means to produce retention requires _____ removal of tooth structure and produces a _____ retentive force between tooth and restoration.
    a. more; stronger
    b. more; weaker
    c. less; stronger
    d. less; weaker

    ANS: C
    The technique of chemical bonding rather than mechanical means to produce retention requires less removal of tooth structure and produces a stronger retentive force between tooth and restoration. Additionally, it can seal the margin of the restoration to prevent seepage of bacteria and fluids through percolation.

    REF: p. 13 TOP: Retention

17. Which of the following statements is true for the property of wetting as related to dental materials?
    a. The Teflon surface of cooking equipment has good wetting.
    b. A thin film of dental cement is desirable to cement crowns.
    c. Liquids generally spread better over low surface energy surfaces.
    d. A surface has high surface energy when liquids bead up on the surface.

    ANS: B
    A thin film of dental cement is desirable to cement crowns. This allows the cement to completely wet the surfaces and for excess material to flow from under the crown when it is seated under pressure during cementation. The Teflon surface of cooking equipment has poor wetting. The surface has low surface energy such as on wax or many plastics when liquids bead up on the surface. Liquids generally wet or spread over high surface energy surfaces better; metals, ceramics, and enamel have high surface energies.

    REF: p. 14 TOP: Retention

18. Microleakage into the interface between tooth structure and restorative material is responsible for much of the _____ observed following tooth restoration.

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1. recurrent decay
2. marginal staining
3. postoperative sensitivity
4. tarnish

a. 1, 2, 3, 4
b. 1, 2, 3
c. 2, 3, 4
d. 1, 2

ANS: B
Microleakage into the interface between tooth structure and restorative material is responsible for much of the recurrent decay, marginal staining, and postoperative sensitivity observed following tooth restoration.

REF: p. 14 TOP: Microleakage

19. _____ refers to the intensity or strength of the color.
a. Hue
b. Value
c. Chroma
d. Opacity

ANS: C
Chroma refers to the intensity or strength of the color. Hue is the dominant color of the wavelength detected. Value describes how light or dark the color is. If light is completely absorbed by the object, it is opaque.

REF: p. 14 TOP: Esthetics

20. Which of the following is considered to be the most reliable means of clinical assessment of composite and glass ionomer restorations?
a. The patient history
b. Evaluation of radiographs
c. Use of the air-water syringe
d. Tactile evaluation of the tooth surface

ANS: D
Tactile evaluation of the tooth surface is considered to be the most reliable means of clinical assessment of composite and glass ionomer restorations. Some composite and glass ionomer restorations may have a rougher surface than enamel. Tracing the enamel surface onto the restoration with the sharp tip of an explorer is the best way to distinguish this difference. The clinician will detect a smooth surface on the enamel and a “scratchy” surface on the restoration.

REF: pp. 15-16 TOP: Detection of Restorative Materials

21. Which of the following would not be an adverse effect of a material?
a. Toxicity
b. Hyposensitivity
c. Hypersensitivity
d. Postoperative sensitivity

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ANS: B
Adverse responses may include postoperative sensitivity, toxicity, and hypersensitivity.

REF: p. 9 TOP: Biocompatibility

22. Of the three types of forces, which is most concerned with the stretching of a material?
    a. Tensile force
    b. Compressive force
    c. Shearing force

ANS: A
Tensile force is applied in the opposite direction as it pulls or stretches an object.

REF: p. 10 TOP: Force and Stress

23. When an object cannot resist force, _____ occurs.
    a. deformation
    b. distortion
    c. deformation and distortion

ANS: C
If the stress within an object cannot resist the force, distortion or deformation occurs.

REF: p. 11 TOP: Force and Stress

24. Torque is a combination of which forces?
    a. Compressive and tensile
    b. Compressive and torsion
    c. Shearing and tensile
    d. Shearing and compressive

ANS: A
Torque, a.k.a. torsion, is a combination of compressive and tensile forces.

REF: p. 10 TOP: Force and Stress

25. Which material listed would show the lowest level of solubility?
    a. Amalgam
    b. Composite resin
    c. Porcelain
    d. Cement

ANS: C
Porcelain and high noble metals have low solubility. Other restorative materials such as amalgam, composite resin, and cement have varying levels of solubility depending on the properties of each material.

REF: p. 11 TOP: Moisture and Acid Levels

26. Most modern dental materials are made to be moisture resistant.
    a. True
    b. False

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ANS: B
Most materials react adversely to moisture either during placement or over time.

REF: p. 11 TOP: Moisture and Acid Levels

27. Contact between two dissimilar metals in the mouth may result in what reaction?
    a. Galvanic shock
    b. Metallic taste
    c. Electrical current
    d. All of the above are possible.

ANS: D
An environment containing moisture, acidity, and dissimilar metals makes the generation of electrical current possible. This is known as galvanism. The current may result in stimulation of the pulp, called *galvanic shock.* It may also create a metallic taste in the mouth.

REF: p. 12 TOP: Galvanism

28. Why is the coefficient of thermal expansion significant in dental materials?
    a. It measures the change in volume and length of a restoration.
    b. It measures the amount of percolation of the restoration interface.
    c. It measures the change in oral temperature related to foods ingested.
    d. It measures the amount of stress and strain placed on the restoration.

ANS: A
Expansion and contraction are measured using the coefficient of thermal expansion (CTE). This measures the change in volume or length in relationship to the change in temperature.

REF: p. 12 TOP: Temperature

29. Which of the following is *not* a good conductor of temperature?
    a. Gold crown
    b. Amalgam restoration
    c. Composite resin restoration

ANS: C
Metals, such as gold and amalgam, are good conductors of temperature, but nonmetals are poor conductors of temperature.

REF: p. 12 TOP: Temperature

30. Some materials give off heat when mixed. What is this called?
    a. Chemical reaction
    b. Exothermic reaction
    c. Thermal conductivity
    d. Coefficient of thermal expansion

ANS: B
Some materials when mixed will produce heat. This exothermic reaction must be minimized to protect the tooth structures from excess heat, thus causing sensitivity or pulpal damage.

REF: p. 13 TOP: Temperature

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31. What causes microleakage?
    a. A poorly placed restoration
    b. A fracture within a restoration
    c. Expansion and contraction of a restoration
    d. All of the above could cause microleakage.

    ANS: D
    The space between the walls of the preparation and the preparation is called the *interface.* If the interface is not sealed, fluids and microorganisms can penetrate between the tooth surface and the restorative material. This seepage of harmful materials, or microleakage, results in tooth sensitivity, recurrent decay, and marginal staining.

    REF: p. 14 TOP: Microleakage

32. Which term describes the thicker or thinner a material is?
    a. Density
    b. Viscosity
    c. Flowability
    d. Thixotropic

    ANS: D
    Viscosity is a material's ability to flow. The thicker the material, the harder it is to flow.

    REF: p. 13 TOP: Retention

33. Adhesion is the method of _____ retention.
    a. chemical
    b. mechanical
    c. dual

    ANS: A
    Retention may be mechanical, chemical through adhesion, or a combination of the two.

    REF: p. 13 TOP: Retention

34. The color range of a tooth is usually seen by the human eye as yellow or brown. What is this component classified as?
    a. Hue
    b. Value
    c. Chroma

    ANS: A
    The three components of color result in hue, chroma, and value. Hue is the dominant color of the wavelength detected. Teeth are predominately seen in the yellow and brown ranges. Chroma is the intensity or strength of the color. Value describes how light or dark the color is.

    REF: p. 14 TOP: Esthetics

35. Which of the following is not a concern regarding identification of dental materials in the mouth?
    a. Therapeutic agents could erode some materials.

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b. Scaling could damage the surfaces of some materials.
c. Both are concerns when materials are identified.

ANS: C
It is important that oral health care professionals are able to identify restorative materials within the oral environment, to treat them appropriately. Heavy pressure during scaling, the use of sonic and ultrasonic scaling or air polishing, and inappropriate use of polishing agents may gouge or scratch the surface of a restoration.

REF: p. 15 TOP: Detection of Restorative Materials

36. What is the thermal conductivity of composite resin?
a. Similar to tooth structure
b. Lower than tooth structure
c. Similar to metal restorations
d. Does not conduct temperature

ANS: A
Thermal conductivity is the rate at which heat flows through a material. Metals are particularly excellent conductors. Gold is one of the best thermal conductors, but non-metals such as ceramics, resins, cements, enamel, and dentin are poor conductors.

REF: p. 12 TOP: Temperature

MATCHING

Match the items with the correct description below.
a. Electrical current between two dissimilar metals
b. Discoloration due to oxidation of the metal's surface
c. Deterioration of the metal due to moisture and acid present in the oral
d. The rate at which heat flows through a material
e. Opening and closing of a gap between the restoration and the tooth surface

1. Corrosion
2. Tarnish
3. Galvanism environment
4. Thermal conductivity
5. Percolation

1. ANS: C REF: p. 11 TOP: Moisture and Acid Levels
2. ANS: B REF: p. 12 TOP: Moisture and Acid Levels
3. ANS: A REF: p. 12 TOP: Galvanism
4. ANS: D REF: p. 12 TOP: Temperature
5. ANS: E REF: p. 12 TOP: Temperature

SHORT ANSWER

1. List and describe the three basic types of force.

ANS:

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- Compressive force. Force applied to compress an object. Posterior teeth are ideally suited for this type of force. The large occlusal surface and the multirooted base will resist a crushing force.
- Tensile force. Force applied in opposite directions to stretch and object. When biting forces are used to stretch a material, the tooth is exerting tensile forces.
- Shearing force. Force applied when two surfaces slide against each other or in a twisting or rotating motion. An incisor used for cutting is an example of shearing forces.

REF: p. 10 TOP: Force and Stress

2. List and describe the three components of color.

ANS:
- Hue: The dominant color of the wavelength reflected
- Value: How light or dark the color is
- Chroma: The intensity or strength of the color

REF: p. 14 TOP: Esthetics

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