Dental Materials 11th edition Powers Test Bank

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MULTIPLE CHOICE

1. For which of the following materials do dimensional changes occur during setting as a result of a chemical reaction?
   a. Elastomeric impression materials
   b. Gold restorations
   c. Wax patterns
   d. A and C
   e. B and C

   ANS: A

	Feedback
A	Dimensional changes occur during setting as a result of a chemical reaction with elastomeric impression materials. Resin composite materials also set as a result of a chemical reaction and undergo shrinkage.
B	Gold restorations undergo dimensional changes from cooling during fabrication.
C	Wax patterns undergo dimensional changes from cooling during fabrication.
D	A and C are incorrect answers.
E	B is an incorrect answer, and C is an incorrect answer.

DIF: Comprehension REF: p. 15 OBJ: 1
TOP: CDA, GC, III. Chairside Dental Materials (Preparation, Manipulation, and Application)
MSC: NBDHE, 6.0 Providing Supportive Treatment Services, 6.1 Properties and Manipulation of Materials

2. How is the percentage of dimensional change measured?
   a. An original length or volume
   b. The final length or volume
   c. The compressive strength
   d. The tensile strength
   e. The shear strength

   ANS: A

	Feedback
A	The dimensional change usually is expressed as a percentage of an original length or volume, not the final length or volume.
B	The dimensional change usually is expressed as a percentage of an original length or volume, not the final length or volume.
C	Compressive strength is a measure of stress that may result when force is applied to a material.
D	Tensile strength is a measure of stress that may result when force is applied to a material.
E	Shear strength is a measure of stress that may result when force is applied to a material.

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DIF: Knowledge REF: p. 15 OBJ: 1
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3. The volumetric dimensional change is equal to _____ times the linear dimensional change.
   a. two
   b. three
   c. four
   d. six

   ANS: B

	Feedback
A	Two is an incorrect answer.
B	The volumetric dimensional change is equal to three times the linear dimensional change. Volume is described as length times width times depth (or height).
C	Four is an incorrect answer.
D	Six is an incorrect answer.

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4. Because the thermal expansion of a restorative material usually does not match that of the tooth structure, a differential expansion or contraction occurs that may result in leakage of oral fluids between the restoration and tooth.
   a. Statement 1 is correct; statement 2 is correct.
   b. Statement 1 is correct; statement 2 is incorrect.
   c. Statement 1 is incorrect; statement 2 is correct.
   d. Statement 1 is incorrect; statement 2 is incorrect.

   ANS: A

	Feedback
A	Statement 1 is correct; statement 2 is correct.
B	Statement 1 is correct; statement 2 is correct.
C	Statement 1 is correct; statement 2 is correct.
D	Statement 1 is correct; statement 2 is correct.

DIF: Comprehension REF: p. 15 OBJ: 2
TOP: CDA, GC, III. Chairside Dental Materials (Preparation, Manipulation, and Application)
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5. A new addition silicone impression material is tested for linear dimensional change upon setting. The result of –0.34% indicates that _____ took place within 24 hours after setting.

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a. linear expansion
b. linear shrinkage
c. thermal expansion
d. thermal shrinkage

ANS: B

	Feedback
A	Linear thermal expansion is expressed as a coefficient of thermal expansion.
B	The result is a negative number, which indicates shrinkage took place.
C	Thermal expansion is measured by determination of the difference in the length of a specimen at two temperatures.
D	Shrinkage is measured by determination of the difference in the length of a specimen at two temperatures.

DIF: Knowledge REF: p. 15 OBJ: 1
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6. The thermal coefficient of expansion _____ uniform throughout the entire temperature range and is usually _____ for liquids than solids.
a. is; lower
b. is; higher
c. is not; lower
d. is not; higher

ANS: D

	Feedback
A	The thermal coefficient of expansion for a solid generally increases at some point as the temperature is increased.
B	The thermal coefficient of expansion for a solid generally increases at some point as the temperature is increased.
C	The thermal coefficient of expansion for a solid generally increases at some point as the temperature is increased.
D	The thermal coefficient of expansion is not uniform throughout the entire temperature range and is usually higher for liquids than solids.

DIF: Comprehension REF: p. 16 OBJ: 2
TOP: CDA, GC, III Chairside Dental Materials (Preparation, Manipulation, and Application)
MSC: NBDHE, 6.0 Providing Supportive Treatment Services, 6.1 Properties and Manipulation of Materials

7. Which of the following restorative materials has a linear thermal coefficient of expansion that is lower than that of human teeth?
a. Ceramics
b. Composites
c. Dental amalgam
d. Unfilled acrylics and sealants

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ANS: A

	Feedback
A	Ceramics have a linear thermal coefficient of expansion of 14. Teeth have a linear thermal coefficient of expansion of 15.
B	The linear thermal coefficient of expansion of composites is 68.
C	The linear thermal coefficient of expansion of dental amalgam is 28.
D	The linear thermal coefficient of expansion of unfilled acrylics and sealants is 100.

DIF: Knowledge REF: p. 16 OBJ: 2
TOP: CDA, GC, III Chairside Dental Materials (Preparation, Manipulation, and Application)
MSC: NBDHE, 6.0 Providing Supportive Treatment Services, 6.1 Properties and Manipulation of Materials

8. Which of the following dental restorative materials has a linear coefficient of thermal expansion closest to teeth?
   a. Unfilled acrylics and sealants
   b. Glass ionomer base
   c. Dental amalgam
   d. Composites
   e. Gold alloys

ANS: A

	Feedback
A	Unfilled acrylics and sealants have a linear coefficient of thermal expansion of 70-100.
B	Glass ionomer base has a linear coefficient of thermal expansion of 10-11.
C	Dental amalgam has a linear coefficient of thermal expansion of 22-28.
D	Composites have a linear coefficient of thermal expansion of 25-68.
E	Gold alloys have a linear coefficient of thermal expansion that is closest to teeth.

DIF: Knowledge REF: p. 16 OBJ: 2
TOP: CDA, GC, III Chairside Dental Materials (Preparation, Manipulation, and Application)
MSC: NBDHE, 6.0 Providing Supportive Treatment Services, 6.1 Properties and Manipulation of Materials

9. What occurs as the result of a discrepancy between the linear thermal coefficient of expansion between teeth and the restorative material if there is no bonding?
   a. Stress
   b. Strain
   c. Percolation
   d. Yield strength
   e. Elastic modulus

ANS: D

	Feedback
A	If the restoration is bonded, then stress occurs at the interface of the tooth and

	restoration.
B	Strain occurs as result of the change in length or deformation by unit.
C	Percolation occurs as the result of a discrepancy between the linear thermal coefficient of expansion between teeth and the restorative material. It is thought to be undesirable due to possible irritation to the dental pulp and recurrent decay.
D	Yield strength is affected by stress at some arbitrary value.
E	Elastic modulus equals the ratio of stress to strain.

DIF: Knowledge REF: p. 20 OBJ: 6
TOP: CDA, GC, III Chairside Dental Materials (Preparation, Manipulation, and Application)
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10. Percolation is thought to decrease with time following insertion of which of the following dental restorative materials?
    a. Filled resin composite
    b. Unfilled acrylic resin
    c. Dental amalgam
    d. Cast gold
    e. Ceramic

ANS: D

	Feedback
A	Filled resin composite is restoration that is either bonded or cemented into place. Percolation related to these restorations would place stress at the interface, which over time would lead to failure of the bond.
B	Unfilled acrylic resin is restoration that is either bonded or cemented into place. Percolation related to these restorations would place stress at the interface, which over time would lead to failure of the bond.
C	Percolation is thought to decrease with time with dental amalgam, presumably as a result of the space being filled with corrosion products from the amalgam.
D	Cast gold is restoration that is either bonded or cemented into place. Percolation related to these restorations would place stress at the interface, which over time would lead to failure of the bond.
E	Ceramic is restoration that is either bonded or cemented into place. Percolation related to these restorations would place stress at the interface, which over time would lead to failure of the bond.

DIF: Knowledge REF: p. 16 OBJ: 2
TOP: CDA, GC, III Chairside Dental Materials (Preparation, Manipulation, and Application)
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11. What is used as a measurement of heat transfer?
    a. Linear coefficient of thermal expansion
    b. Thermal conductivity
    c. Galvanism
    d. Absorption
    e. Adsorption

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ANS: B

	Feedback
A	Linear coefficient of thermal expansion is determined by the length of a specimen at two temperatures.
B	Thermal conductivity is used as a measure of heat transferred.
C	Galvanism is the generation of an electric current a patient can feel.
D	Absorption refers to uptake of liquid.
E	Adsorption refers to concentration of molecules at the surface of a solid or liquid.

DIF: Knowledge REF: p. 16 OBJ: 2
TOP: CDA, GC, III Chairside Dental Materials (Preparation, Manipulation, and Application)
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12. Which of the following dental restorative materials has the greatest thermal conductivity?
    a. Resin composites
    b. Unfilled acrylics
    c. Dental amalgam
    d. Gold alloys
    e. Ceramic

ANS: D

	Feedback
A	Resin composites have thermal conductivities comparable to tooth structure.
B	Unfilled acrylics have lower thermal conductivity than enamel.
C	The thermal conductivity of dental amalgam is substantially lower than gold.
D	Gold alloys have the greatest thermal conductivity.
E	Ceramic has thermal conductivity comparable to tooth structure.

DIF: Knowledge REF: p. 16 OBJ: 2
TOP: CDA, GC, III Chairside Dental Materials (Preparation, Manipulation, and Application)
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13. Which of the following dental materials has a thermal conductivity that is most similar to tooth structure?
    a. Composites
    b. Gold alloys
    c. Dental amalgam
    d. Zinc phosphate cement
    e. Zinc oxide–eugenol cement

ANS: B

	Feedback
A	Composites have thermal conductivity most similar to tooth structure.
B	Gold alloys have thermal conductivity higher than tooth structure.

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C	Dental amalgam has some thermal conductivity but not at a level similar to tooth structure.
D	Zinc phosphate cement is a poor conductor of temperature and is used for insulating bases.
E	Zinc oxide–eugenol cement is a poor conductor of temperature and is used for insulating bases.

DIF: Knowledge REF: p. 16 OBJ: 2
TOP: CDA, GC, III Chairside Dental Materials (Preparation, Manipulation, and Application)
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14. Why are cavity varnishes and liners ineffective as thermal insulators?
    a. Used in thin layers
    b. High thermal conductivity
    c. Low coefficient of thermal expansion
    d. High coefficient of thermal expansion

ANS: A

	Feedback
A	Cavity varnishes and liners have low thermal conductivities but are used in layers so thin that they are ineffective as thermal insulators.
B	Varnishes and liners have low thermal conductivity.
C	Low coefficient of thermal expansion is a measurement of how much a material expands.
D	High coefficient of thermal expansion is a measurement of how much a material expands.

DIF: Knowledge REF: p. 16 OBJ: 2
TOP: CDA, GC, III Chairside Dental Materials (Preparation, Manipulation, and Application)
MSC: NBDHE, 6.0 Providing Supportive Treatment Services, 6.1 Properties and Manipulation of Materials

15. Which of the following is an electrical property of interest in the mouth?
    a. Coefficient of thermal expansion
    b. Elastic modulus
    c. Percolation
    d. Galvanism
    e. Ductility

ANS: D

	Feedback
A	Coefficient of thermal expansion measures how much a material expands.
B	Elastic modulus is equal to the ratio of stress to strain in the liner portion of the stress-strain curve.
C	Percolation occurs as the result of a discrepancy between the linear thermal coefficient of expansion between teeth and the restorative material.
D	Galvanism is an electrical property. Galvanism results from the presence of

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	dissimilar metals in the mouth. Metals placed in an electrolyte have various inherent tendencies to go into solution.
E	Ductility is the percent of elongation.

DIF: Knowledge REF: p. 17 OBJ: 2
TOP: CDA, GC, III Chairside Dental Materials (Preparation, Manipulation, and Application)
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16. Given a schematic sketch of two opposing teeth, one with a temporary aluminum alloy crown and the other with a gold crown, which one would be the electrolyte?
    a. Saliva
    b. Gold crown
    c. Difference in electrical potential
    d. Temporary aluminum alloy crown

ANS: A

	Feedback
A	The saliva functions as the electrolyte.
B	Gold crown does not go into solution.
C	The difference in electrical potential in this case would be 2.69 volts. The patient experiences pain and a metallic taste.
D	Temporary aluminum alloy crown has a tendency to go into solution.

DIF: Knowledge REF: p. 17 OBJ: 2
TOP: CDA, GC, III Chairside Dental Materials (Preparation, Manipulation, and Application)
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17. What refers to the uptake of liquid by a bulk solid?
    a. Absorption
    b. Adsorption
    c. Hydrophilic
    d. Hydrophobic

ANS: A

	Feedback
A	Absorption refers to the uptake of liquid by a bulk solid.
B	Adsorption indicates concentration of molecules at the surface of a solid or liquid.
C	Hydrophilic surface is readily wetted if the solution is water.
D	Hydrophobic surface is resistant to wetting if the solution is water.

DIF: Knowledge REF: p. 17 OBJ: 3
TOP: CDA, GC, III Chairside Dental Materials (Preparation, Manipulation, and Application)
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18. Which of the following terms indicates concentration of molecules at the surface of a solid or liquid?
    a. Corrosion
    b. Adsorption
    c. Absorption
    d. Hydrophilic

    ANS: B

	Feedback
A	Corrosion is the dissolution of metals in the mouth.
B	Adsorption indicates concentration of molecules at the surface of a solid or liquid.
C	Absorption is the uptake of liquid by a bulk solid.
D	Hydrophilic surface is readily wetted if the solution is water.

    DIF: Knowledge REF: p. 17 OBJ: 3
    TOP: CDA, GC, III Chairside Dental Materials (Preparation, Manipulation, and Application)
    MSC: NBDHE, 6.0 Providing Supportive Treatment Services, 6.1 Properties and Manipulation of Materials

19. With regard to wettability and water, what does a low contact angle indicate?
    a. The material is hydrophilic.
    b. The material is hydrophobic.
    c. The contact angle is greater than 90°.
    d. Both A and C are correct.
    e. Both B and C are correct.

    ANS: A

	Feedback
A	A low contact angle indicates the material is hydrophilic.
B	If the contact angle is greater than 90°, poor wetting occurs.
C	The material is considered hydrophobic if the liquid is water.
D	A is correct, and C is incorrect.
E	B and C are incorrect.

    DIF: Comprehension REF: p. 18 OBJ: 4
    TOP: CDA, GC, III Chairside Dental Materials (Preparation, Manipulation, and Application)
    MSC: NBDHE, 6.0 Providing Supportive Treatment Services, 6.1 Properties and Manipulation of Materials

20. Which of the following choices encourage good wetting?
    a. Low-energy solid
    b. High-energy solid
    c. High-energy liquid
    d. A and C are correct.
    e. B and C are correct.

    ANS: A

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	Feedback
A	Liquids bead up on low-energy solids.
B	High-energy solids and low-energy liquids encourage good wetting.
C	High-energy liquids can be made more wettable by adding a wetting agent.
D	A is correct, and C is incorrect.
E	B and C are incorrect.

DIF: Comprehension REF: p. 18 OBJ: 4
TOP: CDA, GC, III Chairside Dental Materials (Preparation, Manipulation, and Application)
MSC: NBDHE, 6.0 Providing Supportive Treatment Services, 6.1 Properties and Manipulation of Materials

21. On which teeth are the greatest biting forces located?
    a. Molars
    b. Canines
    c. Incisors
    d. Premolars

ANS: A

	Feedback
A	The greatest biting forces are on molars.
B	Canines' maximum biting forces decrease from the molar to the incisor region.
C	Premolars' maximum biting forces decrease from the molar to the incisor region.
D	Incisors' maximum biting forces decrease from the molar to the incisor region.

DIF: Knowledge REF: p. 18 OBJ: 5
TOP: CDA, GC, III Chairside Dental Materials (Preparation, Manipulation, and Application)
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22. Patients with dentures can apply about ____% of the force of those with normal dentition.
    a. 10
    b. 19
    c. 50
    d. 90
    e. 150

ANS: B

	Feedback
A	Patients with dentures can apply about 19% of the force of those with normal dentition.
B	Patients with dentures can apply about 19% of the force of those with normal dentition.
C	Patients with dentures can apply about 19% of the force of those with normal dentition.
D	Patients with dentures can apply about 19% of the force of those with normal dentition.
E	Patients with dentures can apply about 19% of the force of those with normal

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	dentition.

DIF: Knowledge REF: p. 18 OBJ: 5
TOP: CDA, GC, III Chairside Dental Materials (Preparation, Manipulation, and Application)
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23. What is the ratio of the force to the area called?
    a. Stress
    b. Strain
    c. Tensile strength
    d. Elastic modulus

ANS: A

	Feedback
A	The ratio of the force to the area is called *stress*.
B	Strain changes in length per unit of a material produced by stress.
C	Tensile strength results when a material fractures from tensile stress.
D	Elastic modulus is equal to the ratio of the stress to the strain.

DIF: Knowledge REF: p. 18 OBJ: 5
TOP: CDA, GC, III Chairside Dental Materials (Preparation, Manipulation, and Application)
MSC: NBDHE, 6.0 Providing Supportive Treatment Services, 6.1 Properties and Manipulation of Materials

24. For a given force, the _____ the area over which it is applied, the _____ the value of the stress.
    a. smaller; smaller
    b. smaller; larger
    c. larger; larger
    d. A and C
    e. B and C

ANS: B

	Feedback
A	The smaller the area over which force is applied, the larger the value of stress.
B	The smaller the area over which force is applied, the larger the value of stress.
C	The smaller the area over which force is applied, the larger the value of stress.
D	The smaller the area over which force is applied, the larger the value of stress.
E	The smaller the area over which force is applied, the larger the value of stress.

DIF: Comprehension REF: p. 18 OBJ: 5
TOP: CDA, GC, III Chairside Dental Materials (Preparation, Manipulation, and Application)
MSC: NBDHE, 6.0 Providing Supportive Treatment Services, 6.1 Properties and Manipulation of Materials

25. Which of the following statements is true of the proportional limit?
    a. Below the proportional limit a material is plastic, and above the proportional limit it is elastic.

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b. Below the proportional limit a material is elastic, and above the proportional limit it is plastic.
c. A material is elastic both below and above the proportional limit.
d. A material is plastic both below and above the proportional limit.

ANS: B

	Feedback
A	A restoration can be classified as a clinical failure if deformation occurs beyond set limits.
B	Below the proportional limit a material is elastic, and above the proportional limit it is plastic.
C	A restoration can be classified as a clinical failure if deformation occurs beyond set limits.
D	A restoration can be classified as a clinical failure if deformation occurs beyond set limits.

DIF: Knowledge REF: p. 20 OBJ: 6
TOP: CDA, GC, III Chairside Dental Materials (Preparation, Manipulation, and Application)
MSC: NBDHE, 6.0 Providing Supportive Treatment Services, 6.1 Properties and Manipulation of Materials

26. Which of the following statements is true of the tensile and compressive strengths of a material?
a. They may be significantly different.
b. Brittle materials are stronger in tension than in compression.
c. Brittle materials have small differences in tensile and compressive strength.
d. A, B, and C are true.
e. A and C are true.

ANS: A

	Feedback
A	The tensile and compressive strength of a material may be significantly different.
B	Brittle materials such as human enamel, amalgam, and composites have large differences and are stronger in compression than in tension.
C	Brittle materials such as human enamel, amalgam, and composites have large differences and are stronger in compression than in tension.
D	Brittle materials such as human enamel, amalgam, and composites have large differences and are stronger in compression than in tension.
E	Brittle materials such as human enamel, amalgam, and composites have large differences and are stronger in compression than in tension.

DIF: Comprehension REF: p. 20 OBJ: 6
TOP: CDA, GC, III Chairside Dental Materials (Preparation, Manipulation, and Application)
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27. "Measures the energy required to fracture a material" is the definition of which term?
a. Ductility

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b. Resilience
c. Toughness
d. Malleability

ANS: C

	Feedback
A	Ductility is the percent of elongation.
B	Resilience is the energy required to deform a material.
C	The energy required to fracture a material is a measure of its toughness.
D	Malleability is the percent of compression.

DIF: Analysis REF: p. 21 OBJ: 7
TOP: CDA, GC, III Chairside Dental Materials (Preparation, Manipulation, and Application)
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28. Which of the following statements is true of the measure of Knoop hardness?
a. It is obtained by measurement of the short diagonal of an indentation from a diamond indenter.
b. Enamel has a lower Knoop hardness value than dentin and cementum.
c. Hardness is directly related to yield strength and wear resistance.
d. The larger the indentation, the smaller the value.

ANS: D

	Feedback
A	In general, no direct relationship exists between hardness and yield strength and wear resistance.
B	Enamel has a higher Knoop hardness value than dentin and cementum.
C	In general, no direct relationship exists between hardness and yield strength and wear resistance.
D	The larger the indentation of the measurement of the long diagonal from a diamond indenter, the smaller the Knoop hardness value.

DIF: Analysis REF: p. 21 OBJ: 8
TOP: CDA, GC, III Chairside Dental Materials (Preparation, Manipulation, and Application)
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29. Analysis of the strain–time curve indicates that the _____ the time and the _____ force applied to the impression material, the lower the permanent strain and the more accurate the impression.
a. shorter; less
b. longer; less
c. shorter; more
d. longer; more

ANS: A

	Feedback

A	The shorter the time and the less force applied to the impression material, the lower the permanent strain and the more accurate the impression.
B	Longer time will result in more force to the material.
C	Shorter time will result in less force to the material.
D	Longer time will result in more force to the material and compromise the accuracy of the impression.

DIF: Analysis REF: p. 22 OBJ: 9
TOP: CDA, GC, V. A.1b. Patient Education and Oral Health Management
MSC: NBDHE, 6.0 Providing Supportive Treatment Services, 6.1 Properties and Manipulation of Materials

30. Dimensional change may occur during setting as a result of which factor?
    a. Volumetric change
    b. Chemical reaction
    c. Cooling
    d. All of the above
    e. B and C are correct.

ANS: E

	Feedback
A	Volumetric change is more difficult to measure.
B	B and C are correct answers.
C	B and C are correct answers.
D	B and C are correct answers.
E	Dimensional changes may occur during setting as a result of a chemical reaction, such as with elastomeric impression materials or resin composite restorative materials, or from the cooling of wax patterns or gold restorations during fabrication.

DIF: Comprehension REF: p. 15 OBJ: 2
TOP: CDA, GC, III Chairside Dental Materials (Preparation, Manipulation, and Application)
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31. Expansion and contraction rates between dental materials and tooth structure caused by temperature change vary. Gaps at the margins allow fluids to enter the space. What is this known as?
    a. Coefficient of thermal expansion
    b. Thermal conductivity
    c. Dimensional change
    d. Percolation

ANS: D

	Feedback
A	Coefficient of thermal expansion is expressed as the linear difference of a specimen at two temperatures.
B	Thermal conductivity is used to measure heat transference.

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C	Dimensional change is expressed as a percent of the original length.
D	Small gaps result at the junction between the two materials. Oral fluids can penetrate this space. When the temperature returns to normal, this fluid is forced out of the space. This phenomenon is called *percolation*.

DIF: Knowledge REF: p. 16 OBJ: 2
TOP: CDA, GC, III Chairside Dental Materials (Preparation, Manipulation, and Application)
MSC: NBDHE, 6.0 Providing Supportive Treatment Services, 6.1 Properties and Manipulation of Materials

32. Of the following materials, which has the closest coefficient of expansion to tooth structure?
    a. Ceramic
    b. Amalgam
    c. Filled polymers
    d. Composite resins

ANS: A

	Feedback
A	Ceramic is the closest, being one half to one third, and gold alloys being approximately the same as for human teeth.
B	Values for amalgam and composites are about two to five times those of human teeth.
C	Values for unfilled polymers, however, are five to seven times those of teeth.
D	Values for amalgam and composites are about two to five times those of human teeth.

DIF: Knowledge REF: p. 16 OBJ: 2
TOP: CDA, GC, III Chairside Dental Materials (Preparation, Manipulation, and Application)
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33. Which of the following materials has the highest rating related to thermal conductivity?
    a. Glass ionomer
    b. Gold alloy
    c. Enamel
    d. Dentin

ANS: B

	Feedback
A	Glass ionomer cement bases closely replace lost tooth structure with respect to thermal conductivity.
B	Human enamel and dentin are poor thermal conductors compared with gold alloys and dental amalgam, although amalgam is substantially lower than gold.
C	Human enamel and dentin are poor thermal conductors.
D	Human enamel and dentin are poor thermal conductors.

DIF: Knowledge REF: p. 16 OBJ: 2
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MSC: NBDHE, 6.0 Providing Supportive Treatment Services, 6.1 Properties and Manipulation of Materials

34. What causes corrosion?
    a. Contact of two dissimilar metals in the mouth
    b. Poor oral hygiene around restorations
    c. Acidic food and drink
    d. A and C are correct.

ANS: D

	Feedback
A	A and C are correct.
B	Poor oral hygiene around restorations may result in recurrent caries formation.
C	Corrosion also may result from chemical attack of metals by components in food or saliva.
D	Corrosion also can result from this same condition when adjacent restorations are of dissimilar metals. Corrosion may also be a factor due to chemical attacks for food and saliva in the mouth.

DIF: Knowledge REF: p. 17 OBJ: 2
TOP: CDA, GC, III Chairside Dental Materials (Preparation, Manipulation, and Application)
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35. Which term refers to the cause of a metallic taste in the mouth?
    a. Corrosion
    b. Galvanism
    c. Percolation
    d. Contamination

ANS: B

	Feedback
A	Corrosion is a result of the same condition. As a result of the galvanic action, material goes into solution, and roughness and pitting occur.
B	When the two restorations touch, current flows because the potential difference is 2.69 volts, and the patient experiences pain and frequently complains of a metallic taste.
C	Small gaps result at the junction between the two materials. Oral fluids can penetrate this space. When the temperature returns to normal, this fluid is forced out of the space. This phenomenon is called *percolation*.
D	Corrosion may occur if a gold alloy is contaminated with a metal such as iron during handling in the dental laboratory.

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36. What is a material called if a liquid presents a contact angle of wettability greater than 90°?

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a. Viscous
b. Thixotropic
c. Hydrophilic
d. Hydrophobic

ANS: C

	Feedback
A	Viscosity is related to the thickness of a material and may be affected by temperature.
B	Thixotropic materials require force to be distributed.
C	Hydrophilic materials flow readily.
D	If a contact angle is greater than 90°, poor wetting occurs (hydrophobic if the liquid is water).

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37. Which of the following is not a form of stress?
a. Compressive
b. Flexure
c. Strain
d. Shear

ANS: C

	Feedback
A	Compressive is a type of stress that may result when a force is applied to a material.
B	Flexure is a type of stress that may result when a force is applied to a material.
C	Strain is the change in length per unit length of a material produced by stress.
D	Shear is a type of stress that may result when a force is applied to a material.

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38. Which term refers to the change in the length or deformation of a material when subjected to force?
a. Flexure
b. Tensile
c. Strain
d. Shear

ANS: C

	Feedback
A	Flexure is a type of stress.

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B	Tensile is a type of stress.
C	Strain is the change in length or deformation per unit length when a material is subjected to a force.
D	Shear is a type of stress.

DIF: Knowledge REF: p. 19 OBJ: 5
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39. When a material reaches its _____, deformation of a material becomes permanent.
    a. stress-strain curve
    b. ultimate strength
    c. elastic modulus
    d. yield strength

ANS: D

	Feedback
A	Stress–strain curve is the application of various forces to determine the corresponding values of stress and strain.
B	Ultimate strength is the stress at which fracture occurs.
C	Elastic modulus is equal to the ratio of the stress to the strain.
D	Yield strength is the measure of the stress allowed before permanent deformation.

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40. How is the hardness of a dental material reported?
    a. Knoop hardness
    b. Nano-indentation
    c. Diamond indenter
    d. Dynamic properties

ANS: A

	Feedback
A	The hardness of dental materials generally is reported in Knoop hardness.
B	Nano-indentation measures small indentations from small loads.
C	Diamond indenter creates a length of the long diagonal of an indentation.
D	Dynamic properties occur at extremely high rates of loading such as an impact.

DIF: Knowledge REF: p. 21 OBJ: 8
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41. What is the energy it takes to deform a material called?

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a. Relationship
b. Resistance
c. Resilience
d. Rebound

ANS: C

	Feedback
A	Relationship is a distractor.
B	Resistance is a material's ability to stay the same.
C	The energy required to deform a material permanently is a criterion of its resilience.
D	Rebound is a material's ability to return to its original form.

DIF: Knowledge REF: p. 21 OBJ: 7
TOP: CDA, GC, III Chairside Dental Materials (Preparation, Manipulation, and Application)
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42. What is the energy necessary to fracture called?
a. Yield strength
b. Toughness
c. Stress
d. Strain

ANS: B

	Feedback
A	The yield strength is the stress at some arbitrarily selected value of permanent strain, such as 0.001, and thus is always slightly higher than the proportional limit.
B	The energy necessary to fracture a material is a measure of its toughness.
C	When force is distributed over an area, the ratio of the force to the area is called the *stress*.
D	*Strain* is the change in length per unit length of a material produced by stress.

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SHORT ANSWER

1. Detail the significance of thermal dimensional change.

ANS:

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Restorative dental materials are subjected to temperature changes in the mouth. These changes result in dimensional changes in the materials and to the neighboring tooth structure. Because the thermal expansion of the restorative material usually does not match that of the tooth structure, a differential expansion occurs that may result in leakage of oral fluids between the restoration and the tooth.

DIF: Comprehension REF: p. 15 OBJ: 2
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2. Compare and contrast the terms *absorption* and *adsorption*.

ANS:
Absorption refers to the uptake of liquid by the bulk solid. For example, the equilibrium absorption of water by acrylic polymers is in the range of 2%. Adsorption indicates concentration of molecules at the surface of a solid or liquid.

DIF: Analysis REF: p. 17 OBJ: 3
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3. Explain the difference between ductility and malleability.

ANS:
The percents of elongation and compression are important properties in that they are measures of ductility and malleability, respectively. These two properties are indications of the amount of plastic strain or deformation that can occur before the material fractures and, as such, indicate the brittleness of the material.

DIF: Comprehension REF: p. 21 OBJ: 6
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4. What is the purpose of using dental cements as bases within a cavity preparation?

ANS:
The reason for using cements as thermal insulating bases in deep cavity preparations is that although dentin is a poor thermal conductor, a thin layer of it does not provide enough thermal insulation for the pulp unless a cement base is used under the metal restoration.

DIF: Knowledge REF: p. 16 OBJ: 2
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5. Compare and contrast the processes of tarnish and corrosion.

ANS:

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Corrosion is the dissolution of metals in the mouth. Corrosion also can result from this same condition when adjacent restorations are of dissimilar metals. As a result of the galvanic action, material goes into solution, and roughness and pitting occur. Corrosion may also be a reaction to the acids formed by food remnants combining with saliva. Tarnish is a surface reaction of metals in the mouth from components in saliva or foods. Corrosion is destructive whereas tarnish is just unsightly.

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