**DENTAL MATERIALS D150 FINAL EXAMINATION - Fall 2011**

 **INSTRUCTIONS**

1. Place all materials except a #2 pencil and eraser in the back or side of the room, but NOT on the seat or floor next to you.
2. Sit in alternating seats, or as assigned by the exam proctor.
3. You are not permitted to have any materials except a pencil and eraser during the examination. This includes but is not limited to books, notes or papers of any kind, food or drink or containers, pagers, cell phones, computers, pagers, electronic devices of any kind, coats or jackets, or hats.
4. This examination is being conducted under the requirements of the Honor Code and the Academic Regulations, both of which will be fully enforced.
5. Mark your test code, either “11” or “22” in the upper right box of the answer sheet labeled “Optional Codes” in the two columns labeled “test code” and fill in the bubbles for the code printed at the bottom of your test pages.
6. Write in your name and TU identification number on the answer sheet and fill in the corresponding bubbles. DO NOT use your social security number.
7. Turn the answer sheet over and sign and date your answer sheet.
8. Check to make sure that your test booklet contains 50 questions.
9. Answer each question by providing the single BEST response, filling in the corresponding bubble on the answer sheet.
10. No questions are allowed during the examination. Do your best to answer the questions as presented.
11. The examination begins at 2:00 p.m. and ends at 4:00 p.m. at which time your answer sheet will be collected. The exam time includes completing the answer sheet. Additional time will not be provided.
12. When you are finished with the examination, turn in your completed answer sheet directly to one of the proctors. You may keep the examination booklet.
13. For security, answer sheets will be compared to the class roster immediately after the examination.
14. Students **Ahmed-Mehta should be in Lecture Room A and students Miller-Zielinski should be in Lecture Room B**. If you are in the wrong room, please go to the correct room before the exam begins.
15. Once you leave the examination room for any reason, you may not return and must hand in your answer sheet at that time.
16. Students arriving late for the examination will be admitted only until the first person leaves either examination room.
17. Which of the following categories of information would generally be considered to provide the highest level of evidence to support clinical practice decisions?
18. **A systematic review of multiple randomized clinical trials**
19. A matched case-controlled clinical study
20. Multiple case reports from various institutions
21. Studies of clinical simulations using laboratory methods
22. What is the optimum region of application for the air/gas torch flame to melt alloy ingots for centrifugal casting?
23. In the center of the orange zone
24. At the tip of the orange zone
25. At the tip of the oxidizing zone
26. **At the tip of the reducing zone**
27. In the center of the oxidizing zone
28. A cast gold alloy crown has rounded margins instead of the sharp margins that you created in the wax pattern. Which of these actions might correct this problem upon recasting?
29. Decrease the diameter of the sprue
30. Decrease the centrifugal casting force
31. Position the wax pattern further away from the closed end of the investment
32. Two of the above
33. **None of the above**
34. Which of these is a hydrophilic primer coupling agent commonly found in current dentin bonding systems?
35. MMA
36. PMMA
37. Bis-GMA
38. UDMA
39. **HEMA**
40. If a manufacturer forgot to use silane in the production of a microfilled composite resin, what would be the result?
41. Increase in polymerization shrinkage
42. **Increase in crack propagation**
43. Increase in hardness
44. Increase in stiffness
45. The “C-Factor” in a composite resin restoration refers to the
46. Weight-percentage of filler particles in the composite
47. Ratio of enamel surface to dentin surface in the restoration
48. Linear percentage of composite shrinkage due to polymerization
49. **Ratio of bonded composite surfaces to unbounded composite surfaces**
50. What is the approximate total percent expansion required within a gypsum-based casting investment to compensate for alloy shrinkage upon solidification from the melted state?
51. None
52. 15%
53. **1.5%**
54. 0.15%
55. 0.015%
56. This methacrylate molecule is at what stage of polymerization? 
57. Initiation
58. Co-polymerization
59. Cross-linking
60. **Termination**
61. Propagation
62. Approximately how thick is the hybrid zone in dentin created by current bonding systems?
63. **3 microns**
64. 30 microns
65. 3 nanometers
66. 3 millimeters
67. 0.3 millimeters
68. Compared to conventional amalgams, high-copper dental amalgams exhibit…
69. Lower marginal integrity over time
70. Less corrosion resistance over time
71. Higher amounts of gamma-2 phase
72. Lower compressive strength
73. **Lower creep**
74. According to best management practices for dental amalgam waste, which of the following should be placed in biohazard waste receptacles for incineration?
75. Contact amalgam scrap
76. Used amalgam capsules
77. Amalgam debris from chairside traps
78. Two of the above
79. **None of the above**
80. An ideal elastic material with no viscous component has which of the following properties?
81. Strain is independent of modulus upon application of stress
82. **Strain will be completely reversed upon removal of stress**
83. Strain reversal after removal of stress will be time-dependent
84. Strain develops non-linearly upon application of stress
85. Which of the following color properties should be changed if the dentist wants increase the intensity of the specific color of a porcelain crown?
86. Metamerism
87. Fluorescence
88. **Chroma**
89. Value
90. Hue
91. Over-trituration of dental amalgam alloy and mercury causes…
92. Less gamma-1 formation
93. Less gamma-2 formation
94. Less heat generation
95. **Less working time**
96. Less creep
97. Which of the following properties would provide the best indication of a new and unused complete denture’s resistance to fracture if it is dropped and hits the lab porcelain tile floor?
98. Yield strength
99. Diametral compressive strength
100. Fatigue strength
101. **Impact strength**
102. Intertubular dentin is not normally found in which of the following?
103. Sclerotic dentin
104. **Peritubular dentin**
105. Root dentin
106. Primary dentin
107. Secondary dentin
108. Which of the following pairs of materials exhibits the best wetting?
109. Acrylic and water
110. Amalgam and water
111. Teflon and water
112. Gold casting alloys and dental porcelain
113. **Etched enamel and polymer-based occlusal sealants**
114. To demonstrate that a material is ductile, the material must be deformed in excess of its
115. Young’s modulus
116. **Proportional limit**
117. Toughness
118. Ultimate tensile strength
119. Fracture strength
120. The bonding system category abbreviated [EP]+B eliminates the need for
121. Simultaneous application to enamel and dentin
122. Packaging as a two-bottle system
123. **Use of an etching gel**
124. None of the above
125. Why is dentin kept moist just prior to the priming phase of dental bonding procedures?
126. To maintain pulp vitality
127. To dilute dentinal tubule fluid
128. To counteract polymerization shrinkage
129. To accelerate demineralization when acid etching
130. **To promote formation of a hybrid layer**
131. The dispersed phase of microfilled composite resins usually consists mostly of
132. UDMA or bis-GMA
133. TEGMA
134. Silane
135. Ground borosilicate glass
136. **Colloidal silica**
137. If dental materials A and B have the same resilience value, which of the following statements is correct?
138. The toughness values of A and B must be the same
139. **The toughness values of A and B may be the same**
140. The toughness of A and B must be less than the respective resilience values
141. The toughness of A and B may be less than the respective resilience values
142. A linear polymer chain that is made from ethyl methacrylate and butyl methacrylate monomers is made by the process known as
143. **Co-polymerization**
144. Cross-linking
145. Condensation
146. Hybridization
147. Compared to dentin, poly-(methyl methacrylate) has a high value of
148. KHN
149. Elastic modulus
150. Compressive strength
151. **Linear thermal expansion**
152. Which of the following explains why gold and platinum tend to resist corrosion?

Both have relatively high…

1. Density and thermal conductivity
2. **Positive reduction potentials**
3. Thermal diffusivity
4. Melt ranges
5. Ductility
6. Which of the following is added to reversible hydrocolloid by the manufacturer to improve the quality of the surface on gypsum models and dies?
7. **Borax**
8. **Potassium sulfate**
9. Benzoyl peroxide
10. Diatomaceous earth
11. Slurry water
12. The “Gamma-1” phase of set dental amalgam consists of which of the following?
13. Unreacted alloy particles
14. Silver only
15. Tin only
16. **Silver-mercury**
17. Tin-mercury
18. In comparison to typical microfilled composite resins, typical microhybrid composite resins have lower values of
19. Surface hardness
20. Percentage of filler volume
21. Young’s modulus
22. Opacity
23. **Polymerization shrinkage**
24. The difference between homogeneous microfilled composites and heterogeneous microfilled composites is that heterogeneous microfilled composites contain
25. Colloidal silica
26. UDMA in the dispersed phase
27. **Pre-cured composite particles**
28. Less volume percentage of filler in the dispersed phase
29. Nano filler particles
30. Which of the following properties would a material exhibit above its glass transition temperature compared to below its glass transition temperature?
31. **Increased permanent deformation**
32. Increased resistance to indentation
33. Brittle fracture
34. Decreased polymerization
35. To provide the best visual match between a porcelain veneer and an adjacent natural tooth in the widest range of lighting conditions, both the veneer and the tooth should exhibit
36. **Isomerism and fluorescence**
37. Hysteresis and syneresis
38. Metamerism and fluorescence
39. Metamerism
40. Compared to regular set alginate powder, fast-set alginate powder has more of which of the following compounds for the purpose of retarding the setting reaction?
41. Sodium phosphate
42. Calcium sulphate
43. Calcium alginate
44. Guluronan
45. **None of the above**
46. To improve the flow of a dental die stone mix, a lab technician adds more water than recommended by the manufacturer. Which of the following is an effect of this change?
47. Increased reproduction of detail in the set and dried die
48. Decreased porosity in the set and dried die
49. Decreased setting time required to reach the “plastic” stage
50. **Decreased compressive strength of the set and dried die**
51. When a metal alloy implant screw is stressed above its proportional limit, which of the following statements must be true?
52. **The screw exhibits strain**
53. No permanent deformation results
54. The ultimate tensile strength of the metal alloy is exceeded
55. The screw is stressed to its fracture strength
56. How does paraffin wax differ from microcrystalline wax?
57. Paraffin wax has a higher melting point
58. Paraffin wax is polymerized polyethylene
59. Paraffin wax is petroleum-based
60. Paraffin wax cannot be used in casting wax formulas
61. **Paraffin wax shrinks more upon solidification**
62. Compared to reversible hydrocolloid, irreversible hydrocolloid
63. Contains less air
64. **Captures less detail**
65. Has greater recovery upon removal
66. Contains the same chemical mechanism to slow the setting reaction
67. Contains the same filler to provide bulk
68. Colloidal systems can be
69. A gas dispersed in another gas
70. An emulsion
71. A hydrosol
72. a and b
73. **b and c**
74. To increase the compressive strength of a gypsum cast, a dentist tries the following:

*Chooses densite rather than hydrocal*

*Increases the temperature of the mixing water*

*Adds slurry water to the initial mix*

*Waits and uses the cast in the dry state*

How many of these four actions would actually increase the compressive strength?

1. 0
2. 1
3. **2**
4. 3
5. 4
6. Which of the following two types of hydrocolloid, if any, normally exhibits less permanent deformation upon removal from the mouth after allowing sufficient recovery time?
7. **Reversible hydrocolloids**
8. Irreversible hydrocolloids
9. No difference between the two types, but both exhibit permanent deformation
10. Neither exhibits permanent deformation if sufficient recovery time is provided
11. The calories is the unit of measurement for a material’s
12. Heat flow
13. **Specific heat**
14. Thermal diffusivity
15. Thermal expansion
16. Thermal conductivity
17. Which of the following color parameters are quantified in both the L\*a\*b\* and Munsell color systems?
18. Value
19. Chroma
20. Hue
21. **a, b, and c**
22. Which of the following histologic components are found in both enamel and dentin?
23. Imbrication lines
24. **Hydroxyapatite crystals**
25. Rods
26. Tubules
27. Cell processes
28. According to the Sturdevant text, what is the mean size range of filler particles in typical microfilled composite resins?
29. 1-10 microns
30. 0.1 to 1.0 microns
31. **.01 – 0.1 microns**
32. .005 - .01 microns
33. Which of the following restorations can be either a direct or an indirect restoration?
34. Occlusal sealant
35. Cast gold crown
36. Amalgam restoration
37. **Composite resin restoration**
38. Porcelain-fused-to-metal restoration
39. Hygroscopic expansion is a desired property for which of the following?
40. **Gypsum-bonded casting investment**
41. General use dental stone
42. Mounting plaster
43. Fast-setting impression plaster
44. Model stone for dental implant restoration casts
45. Which of the following components are present in both conventional dental amalgam alloy powder and high-copper dental amalgam alloy powder?
46. Gamma-1
47. Gamma-2
48. Free mercury
49. **None of the above**
50. During polymerization of methyl methacrylate in a light-activated system, which of the following molecules is the initial source of free radicals?
51. Urethane dimethacrylate
52. Ethylene glycol dimethacrylate
53. Benzoyl peroxide
54. **Camphorquinone**
55. An organic amine
56. Compared to sample A, sample B has twice the elastic strain for a given tensile stress. Therefore, compared to sample B, sample A must be
57. **More flexible**
58. **Tougher**
59. **More ductile**
60. **Harder**
61. **More viscous**
62. The requirement to have a MSDS (Material Safety Data Sheet) for materials used in the dental office is mandated by
63. **OSHA**
64. FDA
65. ISO
66. ADA
67. EPA
68. Which of the following would create a smear layer on dentin?
69. Forming a hybrid layer
70. Etching with phosphoric acid gel
71. Applying bonding primer
72. **Cutting with a diamond bur**