Dental Materials II: Mid-Term Exam Version 2.2 February 18, 2008

1.. The term "MRT", as it refers to the behavior of elastic impression materials, means:

a. Minimum Removal Time
b. Mouth Removal Time
c. Marginal Retention Time
d. Minimum Reaction Temperature
e. Mean Removal Time

2. Which of the following statements concerning gypsum-bonded investments is false?

a. Should not be used where a constant mold temperature is > 700 ° C.
b. Contains calcium sulfate hemihydrate as a binder.
Contains quartz or cristobalite as refractory components.
Can be used only for thermal expansion techniques.
e. Is a suitable investment for Type III gold high-noble alloy.

3. Which statement concerning the particles of the refractory filler of an investment material is false?

a. The refractory particle size should be uniform.
b. The refractory particle size should not be greater than 75 microns.
c. The refractory particles react chemically with the refractory binder.
d. The refractory particles have a major effect on the smoothness of the mold surface.
e. Increasing the proportion of refractory filler increases thermal expansion.

4. Phosphate-bonded investments have high "green" strength, which means:

a. The investment changes color to a green tint at a critical strength.
b. The investment has a high strength at the precise end of working time.
c. The pre-fired strength of the investment acquired by chemical reaction at room temperature.
d. The strength of the investment after the wax burn-out process.
e. None of the above.

5. As reviewed in class, an acceptable range of accuracy of a cast dental restoration is:

a. 1.5-2.0%
b. 1-1.5%
c. 0.6 -1%
d. 0.1 - 0.5%
e. None of the above

6. Expansion of an investment material is intended to compensate for:

a. Wax and Alloy Shrinkage
b. ½ of Wax & Alloy Shrinkage
c. Casting Ring Shrinkage
d. Flow Behavior of Molden Alloy
e. 3/4th of the alloy shrinkage

7. Which of the following statements concerning phosphate-bonded investments is not correct (i.e., incorrect):

a. Contains ammonium phosphate
b. Contains Silica
c. Contains Magnesium Oxide
d. Contains Calcium Sulfate Hemi-Hydrate
e. Commonly used as an investment for casting PFM ceramic gold and crown and bridge alloys.

8. True or False: Conventional high strength stone (die stone) gives a higher compressive strength than of any of the gypsum-based plaster or dental stone materials.

a. True
b. False

9. In comparison to a gold-based alloy, palladium-based alloys:

a. have an increased tendency to tarnish
b. have increased solidus and liquidus temperature
c. can be used easily with gypsum-based investments
d. have reduced hardness
e. none of the above

10. According to hardness, the Type IV gold dental alloys can be described as:

a. soft
b. medium
c. medium-hard
d. extra-hard
e. none of the above

11. By definition, high-noble alloys:

a. contain a minimum of 50 wt% tin
b. must have a noble metal content of at least 60 wt%, of which at least 40 wt% is gold
c. must have a noble metal content of at least 60 wt%, of which at least 35 wt% is platinum
d. consist of 10 wt% gold, 10 wt% silver, and 80 wt% copper
e. none of the above

12. Noble alloys:

a. have to contain (by definition) at least 15 wt% noble metal
b. are not suitable for porcelain-fused-to-metal (PFM) indications
c. are brittle and can fracture readily
d. do not contain palladium
e. none of the above

13. Use of a special liquid consisting of silica sol in water with phosphate-bonded investments provides for:

a. higher setting expansion
b. higher physical strength
c. lower physical strength
d. a and b
e. a and c

14. Ethyl silicate-bonded investments may be used for base-metal removable partial denture alloys, as well as casting of nickel-based alloys; whereas phosphate bonded investments can not:True or False?

A True
B False

15. Analyze the following two statements concerning calcium sulfate-bonded investments:

Statement 1: The particle size of calcium sulfate hemihydrate has little effect on hydroscopic expansion. F

Statement 2: Reduction in the particle size (finer particles) of silica produces higher setting and hygroscopic expansion.

a. Statements 1 & 2 are both false.
b. Statements 1 & 2 are both true.
c. Statement 1 is true; statement 2 is false.
d. Statement 1 is false; statement 2 is true.

16. The current ADA approach to the classification of dental casting alloys involves which criteria?

a. color & composition
b. composition & physical properties
c. cost & color
d. physical properties & color
e. none of the above

17. Which one of the following statements is characteristic of a high strength die stone?

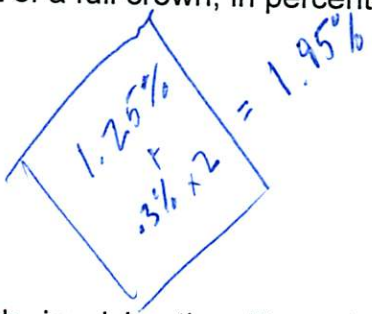
a. The set material contains a high percentage of uncombined water (i.e., ~20%) after setting.
b. Powder particles are irregular, porous, and of low density.
c. The set material has a lower density than plaster.
d. The materials has a higher water/powder ratio than regular stone.
e. None of the above.

Powder is produced by a wet calcination process

18. The approximate expansion requirement of a full crown, in percentage expansion, during the casting process, is:

a. 0.2%
b. 1.0%
c. 10%
d. 2.00%
e. 5%

1.95%



19. Thermal expansion of investment materials, involving the silica polymorph refractory component, is due to the mechanism of:

a) Displacive changes in crystal structure with bond breakage;
b) Displacive changes in the crystal structure without bond breakage;
c) Expansion of the calcium sulfate component;
d) none of the above
e) a & c

20. The basic components of a dental investment material include:

a) a refractory
b) a binder
c) water and/or minor additives to modify setting behavior & expansion
d) all of the above
e) none of the above

21. By definition, base-metal alloys contain less than _____ wt% noble metals.

a. 10
b. 15
c. 25
d. 30
e. none of the above

22. Which of the following element(s) is/are classified as noble?

a. Gold, palladium, and platinum
b. Silver
c. Iridium
d. All of the above
e. (a) and (c)

Palladium Rhodium Gold
Iridium Osmium
Platinum Ruthenium

23. Which element(s) generally serves/serve as hardening element(s) in alloys with high gold content?

a. Copper
b. Silver
c. Palladium
d. Platinum
e. All of the above

24. Which element is added to gold casting alloys specifically as a grain refiner?

a. Zinc
b. Copper
c. Iridium
d. Silver
e. Kryptonite

25. A significant and well-known difficulty with Palladium-Silver alloys is:

a. low elastic modulus
b. high sag tendency
c. "greenish" discoloration of porcelain
d. poor clinical working characteristics
e. poor tarnish and corrosion resistance

26. A dense (>50%), sintered alumina ceramic material is best characterized or classified as: Zirconia

a. A polycrystalline ceramic material;
b. A particle filled glass ceramic material;
c. A predominantly glassy ceramic material;
d. A porcelain glaze or enamel ceramic material;
e. None of the above.

27. The feldspar, the main raw ingredient of classical high-fusing porcelain, melts at about 1150 °C. into: Alumino silicate glasses

a. zirconia and yttrium
b. barium and alumina
c. leucite and molten silicate glass
d. leucite and alumina
e. leucite and zirconia

28. The range of shrinkage that occurs during the firing of porcelain is approximately:

a. 10% - 40%
b. 5% - 9%
c.. 1% - 5%
d. 70% - 80%
e. 0.1% - 2%

29. The process which increases the density of a powdered mass by bonding at points of contact, and which often includes the introduction of heat, is:

a. fusing
b. condensing
c. melting
d. sintering
e. none of the above

30. The leucite ceramic phase of a dental porcelain material offers which of the following property benefits?

a) It raises the coefficient of thermal expansion of the feldspar porcelain.
b) It is resistant to etching and production of a micromechanical retentive structure with strong acids (i.e. hydrofluoric acid).
c) Possesses a refractive index similar to the feldpathic, glassy phase.
d) a, b & c
e) a & c

31. The final firing of the porcelain applied to a porcelain-fused-to-metal (PFM) crown is termed the:

a) glaze bake
b) sinter bake
c) bisque or biscuit bake First Thing
d) powder bake
e) none of the above

32. Dental porcelain enamels, which have a predominantly vitreous structure, are characterized by:

a) physical property behavior typical of a glass;
b) strength higher in tension than compression;
c) a high resistance to crack propagation;
d) presence of a definite melting point;
e) none of the above.

33. The major categories of dental ceramics, according to Kelly, are:

a) Predominantly glassy materials;
b) Low and moderately filled (with crystalline fillers) glasses;
c) Polycrystalline ceramics;
d) All of the above;
a & c

34. In comparing the physical properties of various impression materials; pick the most accurate statement:

a. Polyether impression materials have the greatest flexibility of all elastomers;

b. Addition silicones have low elastic recovery (poor resistance to permanent deformation);

c. Polysulfide impression materials have relatively low (poor) tear strength;

d. Polyether have low flexibility (high stiffness) compared to other elastomeric impression materials;

e. None of the above

35. Reheating and maintaining a high-gold, copper-containing, dental casting alloy to approximately 400 degrees C. for a period of time results in:

a. solid state diffusion of atoms within the alloy;
b. a random solid solution alloy
c. an ordered solid solution alloy
d. a & b;
e. a & c.

36. True or False: The addition of a surfactant to addition silicone impression materials improves their surface wetting or hydrophilic properties.

a. True

b. False

37. True or false: Incomplete casting of the margins (and rounding of the margins) of a gold alloy restoration can be caused by inadequate heating of the metal, lack of sufficient porosity in the investment, or inadequate casting pressure.

a. True

b. False

38. The addition of metallic oxide compounds, such as tin, _____, and iron, to gold alloy; facilitates the formation of an oxide layer which are critical to optimal porcelain-alloy bond strengths. The missing compound in the above sentence is:

a. platinum
b. iridium
c. indium
d. criptonium
e. none of the above

39. In comparing contemporary all-ceramic systems; injection-molded, high-leucite porcelain (i.e., Empress I by Ivoclar) possesses one distinct advantage over the sintered, high density alumina (Procera) or zirconia (Cercon, Lava) substructures:

a. significantly higher flexural strength
b. ability to be etched and bonded to tooth structure
c. significantly higher fracture toughness
d. superior biocompatibility
e. none of the above

40. In terms of its setting behavior or mechanism, tray or border-molding compound would be characterized as a thermoplastic material. True or False?

a. True

b. False

41. Agar (reversible hydrocolloid) has significantly higher physical properties than alginate (irreversible hydrocolloid). True or False?

a. True

b. False