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## Dental Materials II: Final Exam (version 22)

April, 2007

R, RMGI, GI, ZOE, Zinc

1. The retentive strength of a basic (non-reinforced) zinc oxide-eugenol cement:

- (a) Is superior to that of a zinc phosphate cement;
- b) Is superior to that of a glass ionomer cement; **\$**
- c) Equal to the retention of a resin-modified GI;  $\varsigma$
- d) Is poorer than a zinc phosphate cement;
- e) None of the above.

2. Which one of the following statements concerning calcium hydroxide cements is accurate?

- a) major form is classified as a polycarboxylate cement; F
- b) is a phenolate cement that can cure via chelation or free-radical-polymerization reaction;
- c) can be used as a temporary restorative material for posterior teeth;
- d) primarily "on-label" indication for use is permanent cementation (luting);
- e) should not be applied directly on an exposed pulp.

3. True or False: Application of large volumes of flux on two adjacent surfaces to be soldered eliminates the need to pre-clean these surfaces:

# a) True

4. In considering porcelain restorations; the term "cohesive plateau" refers to:

a) the bond strength between porcelain denture teeth and the acrylic denture base;

- b the apparent bond strength between porcelain and alloy equal to the strength of the porcelain itself;
- c) the apparent bond strength between porcelain and alloy less than the strength of the porcelain itself;
- d) a and b
- e) a and c

5. Critical to the selection of a particular veneering porcelain for a PFM metal substructure:

a) Is the selection of a porcelain with a CTE (coefficient of thermal expansion) close to that of the metal;

- b) Is the selection of a porcelain with a CTE (coefficient of thermal expansion) much lower than that of the metal;
- c) Is the selection of a porcelain with a CTE (coefficient of thermal expansion) much higher than that of the metal;
- d) none of the above.

6. True or False: Zinc oxide eugenol and calcium hydroxide (CaOH Salicylate) share the same cement classification, as described by O'Brien.

(a) True b) False

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Polycarboxylate

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7. The chemical accelerator, in a heat-cured, processed, PMMA-based denture base is?

- Campho-Quinone (CQ); a)
- An aromatic amine; b)
- Benzoyl-peroxide; (c)
- An organic peroxide compound; d)
- none of the above. e)
- heat no amilie light no monomer compromer no water 8. If a permanent crown restoration is seated on the preparation in the mouth after the end of the cement's working time but before the completion of its setting time; what could be the negative consequence of this activity?
  - The cement viscosity will decrease rapidly; a)
  - The crown may fail to seat completely on the preparation;
  - Clean-up will be much easier;
  - Nothing negative will most likely occur, the crown will seat properly. d)
- 9. A new dental cement is developed and is tested for its compressive strength. The cement's compressive strength is 40 MPA. Is this level of compressive strength acceptable (according to O'Brien) for a permanent luting cement?:

a) yes Ъ)) по

- 10. A cement which contains Urethane Dimethacrylate (UDMA), BPO and an aromatic amine is included with the fave phosphate in which major class of dental cements? - zoe with phenolate -
  - Phosphate a) Phenolate b) Polycarboxylate Resin None of the above
- 11. Water, zinc acetate, zinc sulfate, and other acidic substances do what to the setting of zinc oxide eugenol cements.
  - Decrease the setting time
  - b) Lengthen the setting time
  - c) Have no effect
- 12. IRM (Intermediate Restorative Material) cements:
  - (a) contains only zinc oxide and eugenol;
  - b) contains polyacrylic acid;
  - c) contains resin monomers and polymerization initiators-accelerators;
  - d) contains pre-polymerized synthetic polymer particles to improve strength properties:
  - e) contains EBA (ethoxybenzoic acid) to improve strength properties

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13. One of the foremost advantages of polycarboxylate cements is:

Very high compressive strengths

Good biocompatibility/Low potential for pulpal irritation

) Dual curing mechanism

- I) Short working time
- e) Greater viscoelasticity than zinc phosphate cement

14. Examples of dental materials which cure by free-radical, addition polymerization:

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(a) Poly methyl methacrylate, composite resin, poly vinylsiloxane elastomers, resinmodified glass ionomer;

- b) Zinc phosphate cement, calcium hydroxide chelate cement, zinc polycarboxylate;
- c) Conventional glass ionomer, Irreversible alginate, reversible hydrocolloid;
- d) A and C
- e) None of the above

15. The proportion of pure gold (its fineness) in a gold solder is usually higher than that of the alloy being soldered. True or false?

a) true false

16. Tin and zinc in relatively fixed amounts (2 to 4%) contribute what property (properties) for gold soldering alloys.

a) Raise the fusing temeperature of the solder;

b Lower the fusing temperature of the solder;

c) Improves corrosion resistance

c) Has no effect on the fusing temperature of the solder.

17. The purpose of using flux in soldering is:

(a) promotes the flow of solder by cleaning the surfaces and removing oxides;

- b) eliminates the need to pre-clean the surfaces to be soldered;
- c) confines the flow of solder away from its area of application;
- d) cleans the surface and promotes the formation of metallic oxides were it is applied;
- e) none of the above.
- 18. In investment soldering of two segments of a four unit fixed partial denture, the critical "gap" distance for minimizing defective soldering is:

less than 0.1 mm;

b) at least 0.1 mm, but no more than the thickness of a business card (0.20-0.34 mm);

- c) more than 0.5 mm;
- d) between 0.05 and 0.1 mm;
- e) none of the above.

19. Preceramic solders used for PFM restoratives contain more tin and zinc than all-gold restoration solders. True or False?



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20. True or False: Polyacid modified composite resins (Compomers) share many of the same components as resin-modified glass ionomers (RMGIs); except water in sufficient qualities to begin an immediate, acid-base glass ionomer reaction.

True b) False

21. Which item(s) below has (have) been demonstrated not to be an advantage (or advantages) of resin modified glass - ionomer (RMGI) cements?

- a) sets by acid-base reaction and polymerization of monomer groups
- b) higher early strength with improved physical properties
- <u>c</u>) early water resistance (solubility)

d)clinically demonstrated reduced post-operative sensitivity au

e) b and c

22. Resin modified glass ionomers (RGMIs) display what type of dimensional change behavior when subjected to an aqueous environment over relatively long periods of time?



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- Little or no dimensional change over time
  - Expansion or increased dimensional change of from 1 percent or more

c) A negative dimensional change (shrinkage)

- d) A significant reduction in compressive strength
- 23. Resin Modified Glass Ionomers (RMGIs) are not currently indicated for cementation of:
  - a) high-strength, polycrystalline, all-ceramic restorative materials
  - b) high strength, sintered alumina or zirconia sub-structures
  - c) porcelain fused to metal restorations
  - d) all metal restorations
  - (e)) glassy and moderately filled, low strength ceramic restorations
- 24. The types of curing modes used in polymer-based cements include:
  - a) visible light polymerization (light-curing)
    - b) chemical-mediated, self-curing polymerization
    - c) dual-curing mechanisms (light and self-curing)
    - (d) All of the above
    - e) None of the above

25. Resin cements, in contrast to other cement types, possess which property (properties):

- a) high strength and toughness;  $\checkmark$
- b) can not be used with high-leucite, pressed ceramic indirect restorations;
- c) have low solubility; T hot very soluable
- (đ)) a and c
- b and c

26. True or false: The chemical compound, 4-META is an adhesion promoter that promotes bonding to tooth structure in self-adhesive resin cements.

(a)) true b) false

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- 27. The oxide layer in an osseointegrated titanium implants:
  - ) is in immediate contact with a thin amorphous proteoglycan layer and continues to grow (a) over time;  $\checkmark$
  - b) remains stable in thickness over time:  $\mathbf{k}$
  - c) decreases in thickness over time; 5
  - d) transforms to a silicon dioxide layer;
  - e) none of the above.
- 28. Osseous crestal changes (at the level of the implant coronal threads) considered within normal limits are:
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- a) 1.0 to 2.0 millimeters marginal bone loss in the first year;  ${\cal T}$
- b) 2.0 to 4.0 millimeters marginal bone loss in the first year;
- c) 0.1 to 0.2 millimeters marginal bone loss per year after the first year:  $\checkmark$
- d) a and b
- a and c *[*e))
- 29. The diagnostic tool that is especially useful in assessing the condition of a failing implant is:
  - a) Use of a CT scan (or some form of 3-D tomography), 2
  - Panoramic radiograph; b)
  - $\bigcirc$ Periapical xrays;
  - Use of a surgical stent; d)
  - e) Use of translumination.

30. Acceptable hygiene aids for the maintenance of dental implants, do not include:

- a) dental floss;
- b) manual or electric toothbrush:
- c) plastic scalers and perio probes;
- **(**d) metal manual or ultrasonic scalers;
- e) chlorhexidine.

31. In two stage implant surgery:

- At stage one, the dental implant is placed, a healing screw is inserted in the fixture, and the implant fixture plus healing screw are buried beneath the mucosa flap for a specific time period;
- b) At stage one, the dental implant is placed and a healing abutment is attached to the implant fixture through the sutured mucosa for a specific time period;
- c) At stage one, the dental implant is placed and a temporary abutment is attached via an abutment screw to support a cemented temporary in light occlusal loading;
- d) None of the above.

32. A "healing screw" is initially placed in the implant fixture:

(a) After completion of placement of an implant in Stage one implant surgery; au

- b) After uncovering an osseointegrated implant in Stage two implant surgery;
- c) At the time of placement of the transmucoal abutment fixture;
- d) When the final abutment is placed;
- e) None of the above

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- 33. Laser welding is especially useful for soldering?
  - a) Base metal frameworks
  - PFM alloy frameworks b)
  - High gold alloy frameworks Q
  - (۵) Titanium frameworks
  - Orthodontic bands ē)

34 Eailure in the development (or breakdown in the process) of osseointegration is characterized by:

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- a) a direct structural and functional connection to ordered living bone;
- b contact predominantly with fibrous soft tissue and fibroblasts; au
- c) an organized structure of living bone with the ability to support a load-carrying implant;
- d) a dynamic interface which matures within time;
- e) occurs with high predictability, at the stable oxide interface of titanium.
- 35. A modern implant abutment is directly fixed and connected to the to the implant fixture by;
  - an abutment screw
  - a coping screw; b)
  - c) a set screw;
  - d) a healing screw.

36. With respect to the strength of titanium used in endosseous, root form, dental implants;

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a) commercially pure (CP) titanium is significantly stronger than titanium alloy (Ti-6AI-4V);

b) titanium alloy (Ti-6AI-4V) is significantly stronger than commercial pure (CP) titanium;

(C) The strength of CP titanium is roughly equal to that of titanium alloy.

37. True or false: Osteoconductive materials do not induce the differentiation of new bone forming cells. but rather act as a scaffold for new bone formation.

True False

- 38. True or false: Osteoinductive materials induce in-situ new bone formation via the conversion of mesenchymal cells preferentially to bone progenitor cells.
  - True False

39. The range of diameters of conventional, abutment, screw-retained dental implants is (are):

- a) 1.8 to 3.0 millimeters in diameter;
- (b) 3.25 to approximately 5 to 5.5 millimeters in diameter;
- c) 5 to approximately 8.0 millimeters in diameter (wide-body implants);
- d) a and b
- e) a and c

40. Surface modification of titanium implant surface does not include;

- a) machined titanium surfaces;
- b) plasma sprayed surfaces;
- ଷ୍ପ tin-plated titanium surfaces;
- sandblasted and etched titanium surfaces;
- e) hydroxyapatite (HA) coated surfaces.

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41. Nylon and polyamide are examples of which class of denture base material:

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- a) Heat-cured acrylic resin denture base material
- b) Auto-cured acrylic resin denture base material
- Dimethacrylate light-activated denture base material દ્રો
- (d) Thermoplastic, injection-mold denture base material
- e) None of the above

42. Plasticizers incorporated into denture base polymers will:

- a) increase rigidity and impact strength
- (b) lower the Glass-Transition Temperature (Tg)
- c) raise the Glass-Transition Temperature (Tg)
- d) improve color stability
- e) decrease the rate at which water or solvents penetrate the denture base polymer
- 43. With respect to methyl methacrylate monomer content, which of the following denture-base materials has little or none: light has ND monewor
  - a) Heat-cured denture base resin:
  - b) Heat-cured, rubber reinforced denture base resin;
  - Light-activated denture base resin; (c)
  - d) Auto-cured denture base resin;
  - e) Heat-cured, fiber reinforced denture base resin
- 44. True or False: High levels of cross-linking agent in heat-cured acrylic denture base resins can result in little risk of increased brittleness in the polymerized denture base. ſ

a) True (b)False

45. This material is used as reinforcing filler in alginate (irreversible) hydrocolloid:

- Barium alumino silicate glass filler a)
- Carbon fibers b)
- Quartz c)
- (I)Diatomaceous earth
- e) None of the above
- 46. True or false: To reduce or eliminate the inhalation problem of alginate dust, the alginate powder in an irreversible hydrocolloid impression material can be coated by the manufacturer with glycol compound:

A

True False

47. Due to a relatively low elastic recovery value of approximately 97 %, alginate (irreversible) hydrocolloid should not be used for which type of clinical impression(s)?



- Fixed partial denture impressions
- b) Preliminary impressions for complete dentures
- c) Orthodontic and study models
- d) Removable partial dentures with clasps
- Items c and d above e)

DMII Final, version 22 Page 8 48. Which of the following statement(s) is/are false?

- a) The elastic recovery (resistance to permanent deformation) of addition silicone is superior to polyether impression material;
- (b) The stiffness and flexibility properties of polyether impression materials provides for easy removal from the mouth after setting.  $\boldsymbol{\xi}$
- c) Decreased water temperature increases the working and setting times of alginates.
  d) Addition silicone impression materials are generally available in a wide range of
- viscosities (i.e., light, medium, and heavy body; monophase and putty viscosities). e) All of the above answers.
- 49. True or false: The speed or rate of removal of elastomeric impression materials in the mouth could affect the permanent deformation of the impression :

true false

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- 50. Sulfur from latex gloves and rubber dams can retard or inhibit the setting reaction of which of the following impression materials?
  - a) Polysulfide
  - b) Reversible (Agar) hydrocolloid
  - c) Polyether
  - d) Irreversible (Alginate) hydrocolloid
  - Addition silicone (Vinyl Polysiloxane)
- 51. The term "MRT", as it refers to the behavior of elastic impression materials, means:

Minimum Removal Time

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

52. 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

53. In a gold-based alloy, palladium does which of the following?

- a. increases tarnish
- **b**increases melting temperature
- c. produces darkening
- d. reduces hardness
- e. none of the above

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

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

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55. According to Douglas, et.al. the estimated demand for complete dentures in the next ten years will:

- Increase by just over 10%
- Increase slightly (5% or less) Б)
- c) Decrease by over 10%
- d) Decrease slightly (less than 10%)
- Remain flat e)

56. The "glass transition temperature" of a polymer is characterized as:

- a) the "softening temperature";
- b) the temperature below which the polymer is glass-like: showing brittle fracture;
- the temperature below which the polymer is rubbery or putty-like: showing deformation: c)
- a and b

40 %

a and c

57. The approximate volumetric shrinkage of a heat-cured denture acrylic denture base material is:



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- 21% 6%
  - 1 to 3%
    - Less than 1% shrinkage

58. The initiator molecule of a heat-cured denture acrylic denture base system is:



- LC\_Amine
- Methyl methacrylate monomer
- 4-META GAUGINE f)
- 59. An advantage of rubber-reinforced denture base materials, as compared to conventional heat-cured acrylic, would be:
- C
- a) reduced stiffness
- b) low impact strength
- (c) higher or improved impact strength
- d) no methyl methacrylate monomer
- e) improved denture base retention compared to other denture base materials

24, 2-2, 2.5

60. From the group of materials:

- Plasticized acrylics (2-1)
- Room-temperature vulcanized (RTV) silicones T Polysulfide rubber \* (2-2)
- (2-3)
- (2-4) Heat-cured silicone
- (2-5) Heavy body alginate

Examples of materials used for permanent soft liners include:

All of the above None of the above (2-2), (2-3), and (2-4) c d-(2-3) and (2-5) (2-1),((2-2)), and (2-4)

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61. A dental casting alloy contains a <u>noble</u> metal content of 50 %, of which 25% is gold. This casting alloy would definite under which ADA classification as a:

a. high noble alloy b. medium noble c. type III gold d noble alloy e. base metal

62. Base metal alloys:

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a have to contain (by definition) at least 25 wt% gold

b. have to contain (by definition) at less than 25% noble metal

- c. must contain more than 30% noble metal
- d. must contain at least 30% palladium
- e. none of the above

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

- a. Copper
- b. Silver
- c. Palladium
- d. Platinum

64. Cement compositions which have demonstrated, both histologically and clinically, the ability to be predictable vital pulp capping agents, forming acceptable dentin bridges, include:

- a. zinc phosphate and polycarboxylate cements;
- b. glass ionomer and polycarboxylate;
- c. resin-modified glass ionomer and conventional glass ionomer;
- (d) calcium hydroxide and mineral trioxide aggregate (MTA)
- e. calcium hydroxide and zinc phosphate.

65. Acrylic chairside soft denture liners have which noteworthy property when used as a soft reline material?

- a. do not bond well to the hard acrylic denture base, thus allowing easy removal;
- b. maintain their resilience over extended periods of time;
- A have high peel strength to hard acrylic denture bases, without the need of a separate bonding agent;
- d. do not absorb stains or odors;
- e. care must be exercised with use of denture cleansers; damage can readily occur.

66. Anti-flux compounds:

- a. promote the flow of molten solder over metal surfaces to be soldered;
- b. clean metal surfaces which will be soldered;
- c. removes flux compounds from surfaces to be soldered;

(d) retards or prevents the flow of molten solder over surfaces to which it is applied;

e. are polishing agents for metal surfaces.