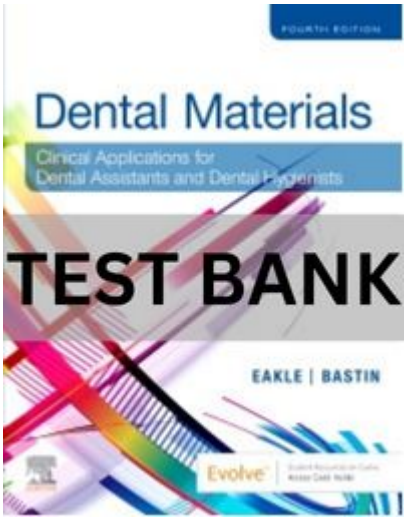
Chapter 01: Introduction to Dental Materials



MULTIPLE CHOICE

1. Until 1970, which of the following groups of dental auxiliaries were allowed to perform intraoral functions in all states?
   1. Dental hygienists
   2. Registered dental assistants
   3. Certified dental assistants
   4. On-the-job trained dental assistants

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

   ANS: D

   Until 1970, only the dental hygienist was allowed to perform intraoral functions in all states. Although laws vary from state to state, virtually every state has modified, updated, and made changes to state restrictions to allow for the performance of intraoral procedures by all allied oral health care practitioners.

   DIF: Apply
   REF: The Role of the Dental Auxiliary in the Use of Dental Materials | p. 1
   OBJ: 2
   TOP: NBDHE, Providing Supportive Treatment Services 6.0 | CODA, GCE Domain IV Diagnostic/Laboratory Procedures and Dental Materials

2. How would a dental office decide which dental materials to use?
   1. Use samples.
   2. Analyze publications.
   3. Dentists preference.
   4. Patient treatment needs.

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

   ANS: A

   The American Dental Association advocates the use of evidence-based dentistry to choose which dental materials are best utilized in the assessment of which dental materials best represent the needs of the dental practice. This evidence is based on scientific information published in professional publications. Other considerations including the use of samples provided by manufactures representatives, the dentists preference related to properties and handling, as well a materials selected for a patients individual treatment needs.

DIF: Apply REF: Evidence-Based Dentistry | p. 2 OBJ: 3
TOP: NBDHE | CODA, GCE Domain IV Diagnostic/Laboratory Procedures and Dental Materials

3. What was the "Amalgam War" fought over?
   a. Mining rights in states in the Western region of the United States
   b. The price of silver in relation to tin and zinc
   c. The value and safety of silver dental amalgam
   d. Patent issues between France and England

   ANS: C

   The "Amalgam War" was fought over the value and safety of silver dental amalgam. It did not end until 1895, when G.V. Black developed an acceptable amalgam formula.

   DIF: Understand REF: The Historical Development of Dental Materials | p. 3
   OBJ: 1
   TOP: NBDHE, Providing Supportive Treatment Services 6.0 | CODA, GCE Domain IV Diagnostic/Laboratory Procedures and Dental Materials

4. Which of the following restorative techniques was first introduced in 1955?
   a. Cast gold inlays
   b. Cohesive gold foil
   c. Acid-etch technique
   d. Synthetic resins for denture bases

   ANS: C

   The acid-etch technique was introduced in 1955. Cohesive gold foil, which could be condensed directly into the cavity preparation, was introduced in 1855. In 1907, Dr. William Taggart demonstrated a casting method to produce gold inlays. Synthetic resins were introduced in 1932; these resins soon replaced rubber as the denture base of choice. Around this time, synthetic resins also became a popular tooth-colored alternative, and, together with the introduction of the acid-etch technique, they have evolved into composite resin, one of the most popular restorative materials.

   DIF: Knowledge REF: The Historical Development of Dental Materials | p. 4
   OBJ: 4
   TOP: NBDHE, Providing Supportive Treatment Services 6.0 | CODA, GCE Domain IV Diagnostic/Laboratory Procedures and Dental Materials

5. What is Dr. Frederick McKay credited with?
   a. Developing an acceptable formula for silver dental amalgam.
   b. Demonstrating a casting method to produce gold inlays.
   c. Noting dental fluorosis in Colorado Spring.
   d. The introduction of dental cements.

   ANS: C

Dr. Frederick McKay is credited with noting dental fluorosis in Colorado Springs in 1901. Together with G.V. Black, he determined that drinking water was the factor. These caries-free but mottled teeth prompted Dr. McKay to suggest changes in the water supply, leading to the first community water fluoridation programs in 1945.

DIF: Apply REF: The Historical Development of Dental Materials | p. 4
OBJ: 4
TOP: NBDHE | CODA, GCE Domain IV Diagnostic/Laboratory Procedures and Dental Materials

6. Since 2005, the American Dental Association (ADA) Seal of Acceptance is awarded to _____ products.
   a. both professional and consumer
   b. professional but not consumer
   c. consumer but not professional
   d. neither professional nor consumer

   ANS: C

   Since 2005, the American Dental Association (ADA) Seal of Acceptance is awarded to consumer but not professional products. Although strictly a voluntary program, more than 1300 consumer dental products carry the Seal of Acceptance. Most common among these are toothpaste, toothbrushes, mouth rinses, floss and other interdental cleaners, sugar-free chewing gum, and denture adherents and cleansers.

   DIF: Analyze REF: The Agencies Responsible For Standards | p. 5
   OBJ: 6
   TOP: NBDHE, Providing Supportive Treatment Services 6.0 | CODA, GCE Domain IV Diagnostic/Laboratory Procedures and Dental Materials

7. Dental materials considered devices, as well as over-the-counter products sold to the public, are subject to control and regulation of the _____ Center for Devices and Radiological Health.
   a. Food and Drug Administration
   b. Drug Enforcement Administration
   c. Centers for Disease Control and Prevention
   d. Department of Human and Health Services

   ANS: B

   Dental materials considered devices, as well as over-the-counter products sold to the public, are subject to control and regulation of the Food and Drug Administration Center for Devices and Radiological Health. The original Food and Drug Act of 1906 did not include provisions to ensure medical and dental device safety or claims. In 1976, the Medical Device Amendment was signed to give the Food and Drug Administration regulatory authority over medical and dental devices, which are now classified and regulated according to their degree of risk to the public.

   DIF: Apply REF: The Agencies Responsible For Standards | p. 5
   OBJ: 5
   TOP: NBDHE, Providing Supportive Treatment Services 6.0 | CODA, GCE Domain IV Diagnostic/Laboratory Procedures and Dental Materials

8. Which of the following represents the standards used to develop specifications and testing on an international level?
   1. International Dental Federation (IDF).
   2. International Standards Organization (ISO).
   3. Food and Drug Administration (FDA).
   4. American Dental Association (ADA).

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

   ANS: C

   The International Dental Federation and the International Standards Organization (ISO) represent the standards used to develop specifications and testing on an international level. These standards are developed through the ISO's technical committee for dentistry (ISO TC 106).

   DIF: Apply REF: The Agencies Responsible For Standards | p. 6
   OBJ: 5
   TOP: NBDHE | CODA, GCE Domain IV Diagnostic/Laboratory Procedures and Dental Materials

9. Which of the following statements is true concerning the American Dental Association (ADA) Seal?
   a. All dental products qualify for the Seal.
   b. It helps consumers make informed decisions about the safety and efficiency of products.
   c. The ADA Seal is usually awarded for the life of the product.
   d. Once a product has been accepted, it does not need to be reevaluated if its composition changes.

   ANS: B

   Consumers and dentists rely on the ADA Seal to assist them in making informed decisions regarding a product's safety and efficiency. Not all dental products qualify for the Seal. The ADA Seal is usually awarded for a period of 5 years, at which time the product is reevaluated. Products that have been previously accepted are also reevaluated anytime their composition changes.

   DIF: Understand REF: The Agencies Responsible For Standards | p. 5
   OBJ: 6
   TOP: NBDHE, Providing Supportive Treatment Services 6.0 | CODA, GCE Domain IV Diagnostic/Laboratory Procedures and Dental Materials

10. In the dental office, who does the delivery of dental materials often fall to?
    1. The dentist
    2. The dental hygienist
    3. The dental assistant
    4. The dental laboratory technician

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

c. 1, 2
d. 1

ANS: B

Each member of the dental team has experience with the delivery of dental materials. In most cases, the dental laboratory technician does not work within the dental office.

DIF: Apply
REF: The Role of the Dental Auxiliary in the Use of Dental Materials | p. 1
OBJ: 2
TOP: NBDHE | CODA, GCE Domain IV Diagnostic/Laboratory Procedures and Dental Materials

11. Which of the following is not a classification of dental materials?
    a. Preventive
    b. Biological
    c. Restorative
    d. Therapeutic

ANS: B

Dental materials are classified as preventive, restorative, and therapeutic materials.

DIF: Understand
REF: The Role of the Dental Auxiliary in the Use of Dental Materials | p. 2
OBJ: 2
TOP: NBDHE, Providing Supportive Treatment Services 6.0 | CODA, GCE Domain IV Diagnostic/Laboratory Procedures and Dental Materials

12. What is the best resource for choosing which dental material to use?
    a. Reading professional journals
    b. Meeting with manufacturers' representatives
    c. Discussing which materials colleagues use
    d. All of the above are good resources.

ANS: D

Professional journals, dental materials manufacturers and manufacturers' representatives, Internet links, and other resources can provide invaluable information.

DIF: Understand REF: Evidence-Based Dentistry | p. 2 OBJ: 3
TOP: NBDHE, Providing Supportive Treatment Services 6.0 | CODA, GCE Domain IV Diagnostic/Laboratory Procedures and Dental Materials

13. The first acceptable amalgam formula was developed by _____ in 1895.
    a. G.V. Black
    b. Pierre Fuchard
    c. Dr. Frederick McKay
    d. Dr. William Taggart

ANS: A

The "Amalgam War" ended in 1895, when G.V. Black developed an acceptable amalgam formula.

DIF: Understand REF: The Historical Development of Dental Materials | p. 3
OBJ: 2
TOP: NBDHE, Providing Supportive Treatment Services 6.0 | CODA, GCE Domain IV Diagnostic/Laboratory Procedures and Dental Materials

14. What is today's approach to dental care referred to as?
    a. Individualized care
    b. Comprehensive care
    c. Science-based dentistry
    d. Evidence-based dentistry

    ANS: B

    The ADA defines evidence-based dentistry as an approach to oral health care that requires the judicious integration of systematic assessments of clinically relevant scientific evidence related to the patient's oral medical history with the dentist's clinical expertise and the patient's treatment needs and preferences.

    DIF: Understand REF: Evidence-Based Dentistry | p. 2 OBJ: 3
    TOP: NBDHE, Providing Supportive Treatment Services 6.0 | CODA, GCE Domain IV Diagnostic/Laboratory Procedures and Dental Materials

15. In history, the earliest recorded mention of restorative dentistry occurs when?
    a. 2500 BC
    b. 600 BC
    c. 1200 AD
    d. 1700 AD

    ANS: B

    Much is found in the literature about treatment options, including remedies of potions and prayer, but no evidence of restorative dentistry exists until around 600 BC to 300 BC.

    DIF: Remember REF: The Historical Development of Dental Materials | p. 3
    OBJ: 1
    TOP: NBDHE, Providing Supportive Treatment Services 6.0 | CODA, GCE Domain IV Diagnostic/Laboratory Procedures and Dental Materials

16. According to the earliest historical mention, in which location was fluoride first used?
    a. China
    b. Prussia
    c. England
    d. Colorado Springs

    ANS: C

    Preventive dentistry had an early beginning, with fluoride first introduced in 1874 and dispensed in England at that time for the prevention of caries.

    DIF: Understand REF: The Historical Development of Dental Materials | p. 4

OBJ: 1
TOP: NBDHE, Providing Supportive Treatment Services 6.0 | CODA, GCE Domain IV Diagnostic/Laboratory Procedures and Dental Materials

MATCHING

Match the items with the correct description below.
a. Food and Drug Administration
b. American Dental Association
c. International Standards Organization

1. Seal of Acceptance
2. Regulation over dental devices
3. Standards to develop specifications on an international level

1. ANS: B DIF: Apply
   REF: The Agencies Responsible For Standards | p. 5 | p. 6 OBJ: 6
   TOP: NBDHE | CODA, GCE Domain IV Diagnostic/Laboratory Procedures and Dental Materials
2. ANS: A DIF: Apply
   REF: The Agencies Responsible For Standards | p. 5 | p. 6 OBJ: 6
   TOP: NBDHE | CODA, GCE Domain IV Diagnostic/Laboratory Procedures and Dental Materials
3. ANS: C DIF: Apply
   REF: The Agencies Responsible For Standards | p. 5 | p. 6 OBJ: 6
   TOP: NBDHE | CODA, GCE Domain IV Diagnostic/Laboratory Procedures and Dental Materials

SHORT ANSWER

1. Why is it important for continued development of dental biomaterials?

   ANS:

   Despite much more effort in health promotion and disease prevention, dental caries remains a major global public health problem. Dental restorations are still needed.

   DIF: Evaluate REF: Future Developments In Dental Biomaterials | p. 6
   OBJ: 5
   TOP: NBDHE, Providing Supportive Treatment Services 6.0 | CODA, GCE Domain IV Diagnostic/Laboratory Procedures and Dental Materials

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.

DIF: Analyze REF: Biocompatibility | p. 10 OBJ: 1
TOP: NBDHE, Providing Supportive Treatment Services 6.1 | CODA, Restorative/Dental Materials and Procedures 1

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.

DIF: Remember REF: Biocompatibility | p. 11 OBJ: 1
TOP: NBDHE, Providing Supportive Treatment Services 6.1 | CODA, Restorative/Dental Materials and Procedures 1

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.

DIF: Understand REF: Biocompatibility | p. 11 OBJ: 1
TOP: NBDHE, Providing Supportive Treatment Services 6.1 | CODA, Restorative/Dental Materials and Procedures 1

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
c. compression
d. chemical bonding

ANS: A

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.

DIF: Apply REF: Force, Stress and Strain | p. 12 OBJ: 1
TOP: NBDHE, Providing Supportive Treatment Services 6.1 | CODA, Restorative/Dental Materials and Procedures 1

5. How much force do denture wearers apply as compared to individuals with intact dentitions?
   a. 40%
   b. 50%
   c. 60%
   d. 70%

   ANS: C
   Denture wearers apply 40% less force than patients with intact dentitions, thus, using 60% force during mastication.

   DIF: Remember REF: Classification of Dental Materials | Force and Stress | p. 11
   OBJ: 3
   TOP: NBDHE, Providing Supportive Treatment Services 6.1 | CODA, Restorative/Dental Materials and Procedures 1

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.

   DIF: Apply REF: Force, Stress and Strain | p. 13 OBJ: 3
   TOP: NBDHE, Providing Supportive Treatment Services 6.1 | CODA, Restorative/Dental Materials and Procedures 1

7. How does force exerted over a large area compare to force exerted over a small area when the same force is applied to each?
   a. Deformation is greater in a small area than in a large area.
   b. Compression on objects in the large area are shortened more than in the small area.
   c. There is little difference in outcome whether the area is large or small.
   d. It will depend on how poorly the force is dissipated over each area.

   ANS: A
   The amount of distortion is determined on the size of the force. Force applied to a small area will cause greater distortion than over a large area. Objects are shortened as a result of compressive force. The larger the area helps dissipate the impact of the force.

DIF: Understand REF: Classification of Dental Materials | Force and Stress | p. 12
OBJ: 3
TOP: NBDHE, Providing Supportive Treatment Services 6.1 | CODA, Restorative/Dental Materials and Procedures 1

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.

   DIF: Remember REF: Water Sorption | p. 14 OBJ: 1
   TOP: NBDHE, Providing Supportive Treatment Services 6.1 | CODA, Restorative/Dental Materials and Procedures 1

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.

   DIF: Understand REF: Corrosion | p. 14 OBJ: 1
   TOP: NBDHE, Providing Supportive Treatment Services 6.1 | CODA, Restorative/Dental Materials and Procedures 1

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

    ANS: A
    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.

    DIF: Understand REF: Corrosion | p. 14 OBJ: 6