**GYPSUM PRODUCTS**

**GYPSUM: It is a mineral mined in various parts of the world. Various gypsum products are widely used in dentistry.**

**Chemical Formula:**

**Gypsum:**

**Gypsum Products\*:**

**CLASSIFICATION:**

**As per A.D.A. Specification No. 25**

|  |
| --- |
| **APPICATIONS** |
| **Type I :****Type II :****Type III :****Type IV :****Type V :** |  |

**MANIPULATION:**

**EXPERIMENT:**

1. **AIM to study the manipulation of dental plaster and preparation of a block.**

**INSTRUMENTS AND MATERIALS:**

1. **Flexible Large Rubber Bowl 6. Porcelain Tile**
2. **Stiff Bladed SS Spatula 7. Sand Paper**
3. **Plaster Knife 8. Dental Plaster**
4. **Stop Watch 9. Water**
5. **Scale 10. Pencil**

**PROCEDURE:**

**MANIPULATION OF DENTAL PLASTER**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **P****L****A****S****T****E****R****C****U****B****E****S** | **S. No.** |  **DATE** |  **WORK DONE** | **GRADE** | **SIGN.** |
|  |  |  |  |  |
| **P****L****A****S****T****E****R****C****U****B****O****I****D****S** |  |  |  |  |  |

**MANIPULATION OF DENTAL PLASTER**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **P****L****A****S****T****E****R****P****Y****R****A****M****I****D****S** | **S. No.** |  **DATE** |  **WORK DONE** | **GRADE** | **SIGN.** |
|  |  |  |  |  |
| **P****L****A****S****T****E****R****C****O****N****E****S** |  |  |  |  |  |

**MANIPULATION OF DENTAL STONE**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S****T****O****N****E****C****U****B****E****S** | **S. No.** |  **DATE** | **WORK DONE** | **GRADE** | **SIGN.** |
|  |  |  |  |  |
| **S****T****O****N****E****C****U****B****O****I****D****S** |  |  |  |  |  |

**MANIPULATION OF DENTAL STONE**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S****T****O****N****E****P****Y****R****A****M****I****D****S** | **S. No.** |  **DATE** | **WORK DONE** | **GRADE** | **SIGN.** |
|  |  |  |  |  |
| **S****T****O****N****E****C****O****N****E****S** |  |  |  |  |  |

**IMPRESSION MATERIALS**

**DEFINITION OF IMPRESSION:**

**CLASSIFICATION:**

|  |  |  |
| --- | --- | --- |
|  | **RIGID** | **ELASTIC** |
| **Set by Chemical Reaction (Irreversible)** |  |  |
| **Set by Temperature Change****(Reversible)** |  |  |

**IDEAL REQUIREMENTS:**

**IMPRESSION COMPOUND**

**CLASSIFICATION:**

**As per A.D.A. Specification No. 3**

**Type I –**

**Type II –**

**As an impression material, it is classified as:**

* **Rigid**
* **Sets by physical change (reversible)**
* **Used for edentulous impression**

**MODE OF SUPPLY:**

**COMPOSITION:**

**Ingredients Function**

**FUSION TEMPERATURE:**

**It indicates a definite reduction in plasticity during cooling. Above this temperature, fatty acids are liquid and form a smooth plastic mass while the impression is being obtained. Thus every detail of the mouth tissues is more likely to be reproduced. The tray is seated and held firmly until the fusion temperature is reached. Below this temperature an accurate and detailed impression cannot be expected.**

**MANIPULATION OF IMPRESSION COMPOUND**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **T****H****U****M****B****I****M****P****R****E****S****S****I****O****N** | **S. No.** |  **DATE** |  **WORK DONE** | **GRADE** | **SIGN.** |
|  |  |  |  |  |

**PROCEDURE:**

**GRADE: Signature of Instructor**

**ZINC OXIDE EUGENOL IMPRESSION PASTE**

**CLASSIFICATION:**

**As per A.D.A. Specification No. 16**

**Type I – Hard**

**Type II – Soft**

**As an impression material, it is classified as:**

* **Rigid**
* **Set by Chemical change (irreversible)**
* **Used for edentulous impression**

**APPLICATIONS:**

**MODE OF SUPPLY:**

**COMPOSITION:**

**Ingredients Function**

**Base Paste.......**

**Catalyst paste........**

**SETTING REACTION:**

**SETTING TIME:**

 **Initial Final**

**Type I**

**Type II**

**FACTORS AFFECTING SETTING TIME:**

**MANIPULATION:**

**EXPERIMENT:**

**AIM: To study the manipulation and properties of impression paste.**

**INSTRUMENTS AND MATERIALS:**

1. **Glass slab or oil-impervious paper pad**
2. **S.S Broad Bladed, Stiff Spatula**
3. **Vaseline**
4. **Special Tray (Custom Tray)**
5. **Zinc oxide-Eugenol Paste**

**MANIPULATION OF ZINC OXIDE EUGENOL PASTE**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **T****H****U****M****B****I****M****P****R****E****S****S****I****O****N** |  **S. No.** | **DATE** | **WORK DONE** | **GRADE** | **SIGN** |

**HYDROCOLLOIDS**

**These are elastic, gel-like substances extensively used as impression materials.**

**COLLOIDS:**

**HYDROCOLLOIDS:**

**Type: I**

 **II**

**GEL:**

**SOL:**

**GELATION:**

**SYNERESIS:**

**IMBIBITION:**

**HYSTERESIS:**

**REVERSIBLE HYDROC0LLOIDS: AGAR**

**A.D.A Specification No. 11**

**CLASSIFICATION:**

**Elastic**

**Sets by physical change (Reversible)**

**Used for edentulous impressions**

**APPLICATIONS:**

**MODE OF SUPPLY:**

**COMPOSITION:**

 **Ingredients Function**

**SETTING REACTION:**

 **Reversible**

 **Gel 100 °c Sol**

**37 - 45 °c**

**GELATION TIME:**

**GELATION TEMPERATURE:**

**GEL STRENGTH:**

**Factors affecting gel strength:**

**MANIPULATION:**

**INSTRUMENTS AND EQUIPMENT:**

1. **Hydrocolloid Conditioner:**

 **Description:**

 **Diagram:**

1. **Tray :**

 **Description**

 **Diagram**

**PROPERTIES:**

**Mechanical:**

1. **Compressive :**
2. **Tear strength :**

**Dimensional Stability:**

**CARE OF IMPRESSION:**

**COMPATIBILITY WITH GYPSUM CAST & DIE MATERIALS:**

**HARDENING SOLUTION:**

**STORAGE OF MATERIAL:**

**DUPLICATING MATERIAL:**

**IMPRESSION DISINFECTION:**

**WET FIELD TECHNIQUE:**

**Grade Signature of Instructor**

**IRREVERSIBLE HYDROCOLLOIDS: ALGINATE**

**CLASSIFICATION:**

 **As per A.D.A. Specification No. 16**

 **Type I -**

 **Type II -**

 **As an impression material it is**

**Elastic**

**Sets by chemical change (irreversible)**

**Used for dentulous and edentulous impression**

**APPLICATIONS:**

**MODE OF SUPPLY:**

**COMPOSITION:**

 **Ingredients Function**

**SETTING REACTION:**

**GELATION TIME:**

**FACTORS AFFECTIONG GELATION TIME:**

**GEL STRENGTH:**

**Factors Affecting Strength:**

**MANIPULATION:**

**EXPERIMENT:**

**AIM: To Study the manipulation and properties of Alginate Impression Material.**

**INTRUMENTS AND MATERIALS:**

1. **Alginate Impression Material**
2. **Flexible Rubber bowl**
3. **Stainless Steel Spatula [Curved and Flexible]**
4. **Perforated Impression Tray**
5. **Water and powder Measures**
6. **Water**

**MANIPULATION OF ALGINATE**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **I****M****P****R****S****S****I****O****N** | **S. No.** | **DATE** | **WORK DONE** | **GRADE** | **SIGN.** |

**PROPERTIES:**

**Mechanical:**

1. **Compressive Strength ---**
2. **Tear Strength ---**

**Dimensional Stability:**

**Shelf Life:**

**REMOVAL OF IMPRESSION:**

 **The strength of the material (gel) increases after set. The elastic properties improve with increase in strength. The impression is removed 2 to 3 minutes after set.**

**CARE OF IMPRESSION:**

**COMPATIBILITY WITH GYPSUM CAST AND DIE MATERIALS:**

**IMPRESSION DISINFECTION:**

**LAMINATE TECHNIQUE:**

**TYPES OF FAILURES:**

 **TYPE Cause**

 **Grade Signature of instructor**

**ELASTOMERIC IMPRESSION MATERIALS**

**SILICONE**

 **POLYSULPHIDE POLYETHER**

 **HEAVY REGULAR LIGHT REGULAR LIGHT HEAVY**

 **BODY BODY BODY BODY BODY BODY**

 **CONDENSATION ADDITION**

 **POLYMERIZING POLYMERIZING**

**PUTTY HEAVY REGULAR LIGHT PUTTY HEAVY REGULAR**

 **BODY BODY BODY BODY BODY**

**ELASTOMERIC IMPRESSION MATERIALS**

 **These are elastic impression materials which are rubber like in nature and are referred to as Non aqueous Elastomeric Dental Impression Materials.**

 **Chemically these are four kinds: Polysulphide, Condensation Polymerizing Silicone, Addition Polymerizing Silicon and Polyether, recently a fifth class of elastomeric impression materials was added, known as visible light-curable polyether urethane dimethacrylate.**

**As impression material they are**

**Elastic**

**Sets by chemical change**

**Used for dentulous and edentulous impressions.**

**GENERAL CHARACTERISTICS:**

1. **Excellent reproduction of tissue detail because of its free flowing nature.**
2. **Generally acceptable odour and colour (except polysulphide-dark brown & unpleasant)**
3. **No special equipment required and easy to handle (except polysulfide messy to handle)**
4. **Generally hydrophobic in nature (except polyether)**
5. **Does not adhere to the trays, so adhesives are required.**
6. **Excellent elastic properties.**
7. **Good dimensional stability (except polysulphide and condensation silicone)**
8. **It can be electroplated.**
9. **It can be disinfected by immersion in chemicals (except polyether-disinfected by spraying).**

**POLYSULPHIDE**

**APPLICATIONS:**

**MODE OF SUPPLY:**

**COMPOSITION:**

 **Ingredients Functions**

**Base Paste:**

**Catalyst Past:**

**SETTING REACTION:**

 **There is cross linking and continued polymerization, the material should be held in the mouth for a longer time for better properties.**

**SETTING TIME:**

**PROPERTIES:**

1. **Color and Odor :**
2. **Working Characteristics :**
3. **Dimensional Change :**
4. **Elastic Recovery :**

**V) Tear Strength:**

**CONDENSATION SILICONE**

**APPLICATIONS:**

**MODE OF SUPPLY:**

**COMPOSITION:**

 **Ingredients Functions**

**Base Paste:**

**Catalyst Paste:**

**SETTING REACTION:**

**SETTING TIME:**

**PROPERTIES:**

1. **Dimensional Stability :**
2. **Hydrophobic Nature :**
3. **Electroplating :**
4. **Shelf Life :**

 **ADVANTAGES DISADVANTAGES**

**ADDITION SLILICONE**

**APPLICATIONS:**

**MODE OF SUPPLY:**

**COMPOSITION:**

 **Ingredients Functions**

**Base Paste:**

**Catalyst Paste:**

 **Release of hydrogen causes dimensional problems thus palladium is added as a hydrogen absorber.**

**SETTING TIME:**

**PROPERTIES:**

1. **Working Time:**
2. **Dimensional Stability :**
3. **Flexibility :**
4. **Hydrophobic Nature :**
5. **Electroplating :**

**ADVANTAGES DISADVANTAGES**

**POLYETHER**

**APPLICATIONS:**

**MODE OF SUPPLY:**

**COMPOSITION:**

 **Ingredients Functions**

**Base Paste:**

**Catalyst Paste:**

**SETTING TIME:**

**PROPERTIES:**

1. **Working Setting Time :**
2. **Dimensional Stability**
3. **Flexibility :**
4. **Hydrophilic Nature :**
5. **Water Absorption :**
6. **Hypersensitivity :**

 **ADVANATAGES DISADVANTAGES**

**MANIPULATION OF ELASTOMERIC IMPRESSION MATERIALS**

**DEMONSTRATION:**

**AIM: To study the manipulation and properties of the various elastomeric impression materials.**

1. **MULTIPLE MIX (DOUBLE MIX) TECHNIQUE :**

 **MATERIALS AND INSTRUMENTS:**

1. **Mixing Pad 2 nos.**
2. **Stiff bladed SS Spatula – 2 nos.**
3. **Syringe**
4. **Custom tray**
5. **Gauge Pieces**
6. **Tray Adhesive**
7. **Heavy Bodied Impression Material**
8. **Light Bodied impression Material**

**PROCEDURE:**

1. **Preparation of the tray :**
2. **Tray Adhesive – application:**

**The adhesive furnished with the various types of rubber impression materials are not interchangeable.**

 **Polysulphide: Butyl rubber or styrene / acrylonitrile dissolved in chloroform or a ketone. Silicone: Polydimethyl siloxane or a similar reactive silicone and ethyl silicate.**

1. **Proportioning. mixing and loading the tray :**
2. **Making of impression**

**11) RELINE TECHNIQUE:**

 **MATERIALS AND INSTRUMENTS:**

1. **Glass Slab/paper Pad**
2. **Perforated Stock Tray**
3. **Tray Adhesive**
4. **Syringe**
5. **Polyethylene Sheet**
6. **Stiff Bladed S.S. Spatula**
7. **Putty and Light Bodied Impression Material**

**PROCEDURE:**

1. **Tray Adhesive-application :**
2. **Proportioning, mixing and loading the tray :**
3. **Making of Impression :**

**REMOVAL OF IMPRESSION:**

**AUTOMATIC MIXING DEVICES:**

**It’s Advantages:**

**PROPERTIES:**

|  |
| --- |
|  **Polysulphide Condensation Addition Silicone Polyether** **Silicone** **Working Time****Setting Time****Tray Adhesive****Dimensional Stability &****Curing Shrinkage****Permanent Deformation****Flow****Accuracy****Flexibility & Thickness of Spacer****Elastic Recovery****Compatibility with Cast & Die****Gypsum****Electroplating****Tear Strength****Shelf Life** |

**DISINFECTION OF IMPRESSION:**

**DENTAL RESINS**

**CLASSIFICATION:**

**IDEAL REQUIREMENTS:**

**POLYMETHYLMETHACRYLATE RESINS**

**As per A.D.A. Specification No. 12**

**TYPES:**

**HEAT CURED ACRYLIC RESINS**

**APPLICATIONS:**

**MODE OF SUPPLY:**

**COMPOSITION:**

 **Ingredients Functions**

**Powder:**

**Liquid:**

**MANIPULATION:**

**EXPERIMENT:**

**AIM: To study the various steps of processing of a wax block.**

**MATERIALS AND INSTRUMENTS:**

**PROCEDURE:**

1. **Preparation of a Wax Block :**
2. **Preparation of a Split mould :**
3. **I) Wax elimination & Application of Separation Medium :**
4. **Tin Foil Substitutes**
5. **Packing of Mould Cavity :**
	1. **Proportioning and Mixing :**

**Physical stages of Reaction:**

**Stage 1:**

**Stage 2:**

**Stage 3:**

**Stage 4:**

**Stage 5:**

**b) Packing:**

 **Trial Closure:**

 **Final Closure:**

1. **Processing :**

 **Prior to processing the flask is kept aside for 15 to 30 minutes. This allows better penetration of the monomer into the polymer. [Sometimes referred to as bench curing]**

**Curing Cycles:**

**Bench Cooling:**

**6) Deflasking:**

**7) Finishing and Polishing:**

**Grade Signature of Instructor**

**INJECTION MOULDING:**

**PROPERTIES:**

1. **Liquid Monomer:**
2. **Colorless and volatile Liquid, Organic Solvent, Phenol Smell.**
3. **Effect of U.V. Light**
4. **Melting Point**
5. **Boiling Point**
6. **Volumetric Shrinkage**
7. **Heat Cured Acrylic Resin:**
8. **Density**
9. **Compressive Strength**
10. **Tensile Strength**
11. **Modulus of Elasticity**
12. **Proportional Limit**
13. **Co-efficient of thermal expansion**
14. **Thermal Conductivity**
15. **Residual Monomer Content**
16. **Solubility**
17. **Creep**
18. **Biocompatibility**

**CHEMICALLY CURED ACRYLIC RESINS**

**APPLICATIONS:**

**MODE OF SUPPLY:**

**COMPOSITION:**

 **Ingredients Functions**

**Powder:**

**Liquid:**

**MANIPULATON:**

1. **Sprinkle on Technique:**
2. **Dough Method:**

**MISCELLANEOUS RESINS:**

**REPAIR RESINS:**

**DENTURE RELINERS:**

**DENTURE ADHESIVES:**

**TISSUE CONDITIONERS:**

**MATERIAL IN MAXILLOFACIAL PROSTHESIS:**

**COMPOSITE RESINS**

**As per A.D.A. Specification No. 27**

**CLASSIFICATION:**

 **Type Particle Size**

**APPLICATIONS:**

**MODE OF SUPPLY:**

**CONPOSITION:**

 **Ingredients**

**POLYMERIZATION MECHANISM:**

**TYPE ACTIVATIOR INITIATOR**

1. **Chemically Activated**
2. **Visible Light Activated**

**SETTING TIME:**

**WORKING TIME:**

**ACID ETCHING:**

1. **Acid used in percentage -**
2. **Function and mode of action-**

**BONDING AGENTS:**

1. **Enamel Bond Agents :**

**Composition**

**Function and Mode of Action -**

1. **Dentin Bond Agents :**
2. **Primers: Types**

 **Function**

1. **Bond Agent:**

 **Agents used Mode of Action**

**PROPERTIES:**

 **HYBRID CONVENTIONAL MICROFILLED PARTICLE SIZE**

**Filler Loading (Vol. %)**

**Compressive Strength (MPa)**

**Modulus of Elasticity**

**Coefficient of**

**Thermal Expansion (10-6/0C)**

**Water Sorption (mg/cm2)**

**KHN**

**Surface Smoothness:**

**Biocompatibility:**

1. **Effect of Monomer:**

**Pulp protection**

1. **Effect of Micro leakage**

**SILVER AMALGAM**

**DEFINITION OF AMALGAM:**

**CLASSIFICATION:**

**1.**

**2.**

**3.**

**4.**

**APPLICATION:**

**MODE OF SUPPLY:**

**COMPOSITION:**

|  |
| --- |
| **INGREDIENTS PERCENTAGE****FUNCTIONS CONVENTIONAL ADMIXED SINGLE COMPOSITION** |

**MANIPULATION:**

**EXPERIMENT:**

**AIM: TO STUDY THE MANIPULATION AND PROPERTIES OF SILVER AMALGEAM.**

**INSTRUMENTS AND MATERIALS:**

1. **Amalgam Dispenser**
2. **Mortar and Pestle**
3. **Amalgam Carrier**
4. **Amalgam Condenser**
5. **Amalgam Carvers**
6. **Ball Burnishers**
7. **Dental napkin**

**PROCEDURE:**

1. **PROPORTIONING :**

**Mercury – alloy ratio:**

1. **Hand Mixing – 6.5**
2. **Eames Tech. – 1:1**
3. **TRITURATION :**

**Objectives:**

**Hand Mixing:**

**Mechanical Mixing:**

1. **CONDENSATION :**

 **Objectives:**

 **Hand Condensation:**

 **Mechanical Condensation:**

1. **CARVING & FINISHING :**
2. **BURNISHING :**
3. **POLISHING :**

**GRADE Signature of Instructor**

**GLASS IONOMER CEMENT**

**CLASSIFICATION**

**As per A.D.A. Specification No. 66**

**Type I**

**Type II**

**Type III**

**APPLICATIONS**

**MODE OF SUPPLY**

**COMPOSITION**

 **Ingredients Functions**

**Powder**

**Liquid**

**SETTING REACTION:**

**SETTING TIME:**

**FACTORS AFFECTIONG SETTING TIME:**

**MANIPULATION:**

**EXPERIMENT:**

**AIM: To study the manipulation of Glass Ionomer Cement.**

**MATERIALS AND INSTRUMENTS:**

1. **Glass Slab or Mixing Pad**
2. **Agate Spatula**
3. **S.S Plastic Filling Instrument**
4. **Tweezer**
5. **Cotton roll**
6. **Glass Ionomer Cement**
7. **Cavity Varnish**
8. **Cellulose Acetate Matrix**

**PROCEDURE:**

**PROPERTIES:**

1. **Mechanical Properties**
2. **Solubility**
3. **Adhesion**
4. **Anticariogenic Properties**
5. **Biological Properties**

**METAL – MODIFIED GLASS IONOMER CEMENTS:**

**RESIN MODIFIED GLASS IONOMER CEMENTS:**

**Grade Signature of Instructor**

**ZINC OXIDE EUGENOL CEMENT**

**CLASSIFICATION**

 **As per A.D.A. Specification No. 30**

 **Type I -**

 **Type II -**

 **Type III -**

 **Type IV -**

**APPLICATIONS:**

**MODE OF SUPPLY:**

**COMPOSITON:**

 **Ingredients Function**

**POWDER:**

**LIQUID:**

**SETTING REACTION:**

**SETTING TIME:**

**FACTORS AFFECTION SETTING TIME:**

**EBA CEMENT:**

**MANIPULATION:**

**EXPERIMENT:**

**AIM: To study the properties and manipulation of zinc oxide eugenol cement.**

**MATERIALS AND INSTRUMENTS:**

1. **Glass Slab**
2. **Stainless Steel Spatula**
3. **S.S Plastic Filling Instrument**
4. **Zinc Oxide Powder and Eugenol Liquid**

**PROCEDURE:**

**PROPERTIES:**

1. **Mechanical Properties :**

**Psi Mpa**

**Compressive Strength -**

**Tensile Strength -**

1. **Solubility and Disintegration :**
2. **Adhesion :**
3. **Optical Properties :**
4. **Biological Properties :**

**Grade Signature of Instructor**

**ZINC PHOSPHATE CEMENT**

**CLASSIFICATION:**

 **As per A.D.A. Specification No. 8**

 **Type I**

 **Type II**

**APPLICATIONS:**

**MODE OF SUPPLY:**

**COMPOSITION:**

 **Ingredients Functions**

**Powder**

**Liquid**

**SETTING REACTION:**

**SETTING TIME:**

**CONTROL OF SETTING TIME:**

**PRECAUTIONS:**

**Care of Powder and Liquid**

**MANIPULATION:**

**EXPERIMENT:**

**AIM: To study the manipulation of Zinc Phosphate Cement.**

**MATERIALS AND INSTRUMENTS:**

1. **Glass Slab**
2. **S.S Plastic Filling Instrument**
3. **Plastic Filling Instrument**
4. **Zinc Phosphate cement – Powder**
* **Liquid**

**PROCEDURE:**

**PROPERTIES:**

1. **Mechanical Properties :**
2. **Solubility and Disintegration :**
3. **Adhesion :**
4. **Biological Properties :**
5. **Optical Properties :**

**Grade Signature of Instructor**

**ZINC POLYCARBOXYLATE CEMENT**

**As per A.D.A. Specification No. 61**

**APPLICATIONS:**

**MODE OF SUPPLY:**

**COMPOSITION:**

 **Ingredients Functions**

**Powder**

**Liquid**

**SETTING REACTION:**

**SETTING TIME:**

**FACTORS AFFECTING SETTING TIME:**

**MANIPULATION:**

**EXPERIMENT:**

**AIM: To study the properties and manipulation of Polycarboxylate Cement.**

**MATERIALS AND INSTRUMENTS:**

1. **Glass Slab or Mixing Pad**
2. **Cement Spatula**
3. **S.S Plastic Filling Instrument**
4. **Polycarboxylate Cement**

**PROCEDURE:**

**PROPERTIES:**

1. **Mechanical Properties :**

**Psi Mpa**

**Compressive Strength -**

**Tensile Strength -**

1. **Solubility and Disintegration:**
2. **Adhesion :**

**Precaution: Tooth surface must be cleaned for better adhesive properties. Polyacrylic acid may be used to condition the tooth surface:**

**Biological Properties:**

**Grade Signature of Instructor**

**CALCIUM HYDROXIDE CEMENTS**

**APPLICATIONS:**

**MODE OF SUPPLY:**

**COMPOSITION:**

 **Ingredients Function**

**Paste 1**

**Paste 2**

**Setting Reaction:**

**Setting Time:**

**FACTORS AFFECTIONG SETTING TIME:**

**MANIPULATION:**

**EXPERIMENT:**

**AIM: To study the properties and manipulation of Calcium Hydroxide Cement.**

**MATERIALS AND INSTRUMENTS:**

1. **Glass Slab**
2. **Cement Spatula**
3. **S.S Plastic Filling Instrument**
4. **Calcium Hydroxide Cement**

**PROCEDURE:**

**PROPERTIES:**

1. **Mechanical Properties :**

**Psi Mpa**

**Compressive Strength -**

**Tensile Strength -**

1. **Solubility and Disintegration:**
2. **Thermal Properties :**
3. **Biological Properties :**

**Grade Signature of Instructor**

**CAVITY VARNISHES, LINERS AND BASES**

**Cavity varnishes, liners and insulating bases are designed to be used as adjuncts to the restorative materials in order to protect the pulp against thermal and chemical insults, micro leakage and certain of these agents themselves have beneficial effects upon the tooth.**

**CAVITY VARNISHES:**

**APPLICATIONS:**

**COMPOSITION:**

**MANIPULATION:**

**PROPERTIES:**

**CONTRAINDICATIONS:**

**CAVITY LINERS:**

**Types:**

**1. Calcium Hydroxide**

**2. Type III Glass Ionomer**

**3. Type IV Zinc oxide - eugenol**

**Composition: [Calcium Hydroxide Liner]**

**Manipulation:**

 **CEMENT BASES:**

**TYPES:**

1. **High Strength Bases :**
2. **Low Strength Bases :**

**Properties:**

1. **Thermal Properties :**
2. **Protection against Chemical Insults :**
3. **Strength :**
4. **Therapeutic Effect :**
5. **Clinical Considerations :**

**Grade Signature of Instructor**

**DENTAL CASTING ALLOYS**

 **Dental casting alloys are used for the fabrication of cast metal restorations, which are fabricated outside the mouth. There are different types of casting alloys used in dentistry.**

**CASTING ALLOYS**

 **Noble Metal Alloys Base Metal Alloys**

**DEFINITIONS:**

**Noble Metals:**

**Previous Metal:**

**Base Metals:**

**Alloys:**

**KARAT:**

**FINENESS:**

**PERCENTAGE:**

**CLASSIFICATION OF DENTAL CASTING ALLOYS:**

* + - 1. **BY FUNCTION : Hardness increases from Type I to type IV.**

**Metal Ceramic RPD Alloys**

* + - 1. **BY DESCRIPTION :**

|  |
| --- |
|  **Crown & Bridge Metal Ceramic RPD****Noble Metal a) Gold Based a) Gold Based a) Type IV Gold Alloys****Alloys b) Non Gold Based b) Non Gold Based****Base Metal a) Nickel Based a) Nickel Based a) Cobalt Chromium****Alloys b) Cobalt Based b) Cobalt based c) Cobalt Chromium Nickel** |

**CLASSIFCATION OF GOLD ALLOY BY FUNCTION: As per A. D. A Specification No. 5 Applications**

**Type I 'A' Soft –**

**Type II 'B' Medium -**

**Type III 'C' Hard-**

**Type IV 'D' Extra Hard-**

**METAL CERAMIC Hard-**

**METAL CERAMIC Extra Hard-**

**REMOVABLE PARTIAL DENTURE:**

**ALLOYS:**

**COMPOSITION:**

**Alloys Au Cu Ag Pd In Sa Fe**

 **% % % % % % %**

**Type I**

**Type II**

**Type III**

**Type IV**

**FUNCTION OF EACH INGREDIENT**

**Ingredients Functions**

**GOLD...**

**SILVER...**

**COPPER...**

**PLATINUM...**

**PALLADIUM...**

**ZINC...**

|  |
| --- |
|  **ALLOYS GOLD ALLOYS METAL CERAMIC** **1. Fusion Temperature Low : 8790C High : 11490 – 13040C** **3500C above that of porcelain** **2. Coefficient of High Low: To be compatible** **thermal expansion dental porcelains** **3. Copper Content Present Absent** |

**HEAT TREATMENT:**

**Types:**

1. **Softening Heat Treatment (Annealing):**
2. **Temperature**
3. **Alteration of Properties**

 **Increases**

 **Decreases**

1. **Indicated**

**b) Hardening Heat Treatment (Age Hardening):**

 **I) Temperature**

 **ii) Alteration of Properties**

 **Increases**

 **Decreases**

1. **Indicated**

**2. Density:**

**3. Yield Strength:**

**4. Hardness:**

**5. Elongation (Ductility):**

**6. Modulus of Elasticity:**

**7. Casting Shrinkage:**

**8. Type of Investment:**

**DENTAL CASTING BASE METAL ALLOYS**

**As per A.D.A. Specification No. 14**

**Types :**

**COBALT - CHROMIUM**

**NICKEL - CHROMIUM**

**COBALT - CHROMIUM - NICKEL**

**APPLICATIONS :**

**COMPOSITION:**

|  |
| --- |
| **Ingredient Function****Cobalt****Chromium****Nickel****Iron & Beryllium****Iron & Beryllium****Molybdenum & Silicone****Boron** |

**PHYSICAL PROPERTIES:**

1. **Melting Range:**
2. **Density:**
3. **Yield Strength:**
4. **Hardness:**
5. **Elongation (Ductility):**
6. **Modulus of Elasticity:**
7. **Casting Shrinkage:**
8. **Type of Investment Used:**

 **COMPARISON OF PROPERTIES OF COBALT – CHROMIUM ALLOYS AND GOLD ALLOYS**

|  |
| --- |
| **PROPERTIES Cobalt-Chromium Type IV Gold** |

**WAXES**

**Waxes are used widely in the intermediate stages of the fabrication of many of the restoration and prosthesis used in dentistry. There are many varieties of waxes and each has particular properties depending on the purpose for which it is used.**

**CLASSIFICATION :**

|  |
| --- |
|  **Pattern Wax Processing Wax Impression Wax**  |

1. **PATTERN WAX**
2. **PROCESSING WAX**
3. **IMPRESSION WAX**

**INLAY CASTING WAX**

**CLASSIFICATION :**

**As per A.D.A Specification No. 4**

**Type I**

**Type II**

**APPLICATIONS:**

**MODE OF SUPPLY:**

**COMPOSITION:**

 **Ingredients Functions**

**IDEAL REQUIREMENTS:**

**PROPERTIES:**

1. **flow :**

**Type I**

**Type II**

1. **Wax Distortion :**

|  |
| --- |
|  **Causes of Distortion Precautions** |

**MANIPULATION:**

1. **Direct Technique – Type I Wax (Medium)**
2. **Indirect Technique – Type II Wax (Soft)**

**CASTING PROCEDURE FOR DENTAL ALLOYS**

**DEMONSTRATION:**

**AIM: To study the steps in casting of the Dental Alloy.**

**INSTRUMENTS AND EQUIPMENT :**

1. **Die 10. Vacuum Mixer**
2. **Die Spacer 11. Burnout Furnace**
3. **Wax Pattern 12. Dental Casting Alloy**
4. **Sprue Wax 13. Flux**
5. **Crucible Former 14. Graphite Crucible**
6. **Ring Liner 15. Casting Machine**
7. **Casting Ring 16. Container of Water**
8. **Wetting Agent 17. Sandblasting Unit**
9. **Investment material 18. 50% Hcl**

**MANIPULATION :**

**I Preparation of Die:**

 **A die of the prepared tooth is made by pouring an elastomeric impression with improved stone.**

**II Preparation of Wax pattern:**

**III Selection & Attachment of Sprue:**

**IV Preparation of Casting Ring:**

 **Type of ring liners:**

**V Investing: (hand / Vacuum)**

**VI Wax Elimination : (Burn Out)**

 **Diagram of a Dental Casting Mould:**

**VII Casting:**

 **Types of casting machines:**

**VIII Quenching:**

**IX Recovery of Casting:**

**X Sandblasting:**

**XI Pickling:**

**XII Separation of Sprue:**

**XIII Finishing and Polishing:**

**CASTING DEFECTS:**

1. **Dimensional Errors in Casting:**

**Problem Cause Precaution**

1. **Rough Surface and Fins:**

**c) Porosity:**

 **Problem Cause Precaution**

**Grade Signature of Instructor**

**DENTAL CERAMICS**

**Dental ceramics are white, translucent, tooth-like material, used for restoring natural teeth and for making artificial teeth. Traditionally they were referred to as 'Porcelains'.**

**GENERAL USES OF PORCELAINS:**

**CLASSIFICATION:**

1. **According to Fusion Temperature:**
2. **According to uses:**

**MODE OF SUPPLY:**

 **In the form of fine ceramic powders in bottles, in different shades of enamel dentin and opaque with special liquid/distilled water.**

**COMPOSITION:**

 **Ingredients Function**

**MANIPULATION:**

1. **Adaptation of Matrix /Metal Substructure:**
2. **Selection of Powder:**
	1. **Core of Opaque**
	2. **Dentin and Enamel**
3. **Mixing: The powder is mixed with the liquid to make a paste and built over the matrix. As shrinkage is anticipated, the crown built up is larger.**
4. **Condensation:**
5. **Objectives:**
6. **Methods:**
7. **FIRING PROCEDURE:**

**Types of Furnace:**

**Advantages of Vacuum Firing:**

**Preheating:**

**Stages of Firing:**

**Low Bisque:**

**Medium Bisque:**

**High Bisque:**

**At any stage the crown can be removed from the furnace, the morphology modified i.e. addition or trimming, and fired again till the right size is obtained.**

**Increased number of firings results in a crown that is overly translucent and lifeless. The fewer firing cycles, the better will be the strength and esthetics.**

1. **GLAZING:**
	1. **Over glaze:**
	2. **Self glaze:**

**PROPERTIES:**

1. **Shrinkage of firing:**
2. **Porosity:**
3. **Chemical Properties:**
4. **Mechanical Properties:**
5. **Thermal Properties:**
6. **Aesthetics:**

**METAL CERAMICS:**

 **Requirements of Alloy for Porcelain to Metal :**

**I)**

**ii)**

**iii)**

**MODE OF BONDING:**

**a) Mechanical Bond:**

**b) Compressive Stresses:**

**c) Chemical Bond:**

**RECENT PORCELAINS:**

**a) Core Porcelains:**

**b) Castable Ceramics:**

**DIFFERENCES BETWEEN PORCELAIN AND ACRYLIC TEETH**

|  |
| --- |
|  **Porcelain Teeth Acrylic Teeth** |

**Grade Signature of Instructor**

**SOLDERING, BRAZING AND WELDING**

**Definitions:**

**Soldering:**

**Brazing:**

**Welding:**

**Desirable Properties of Dental Solders:**

**TYPES:**

* + 1. **Gold Solders:**
		2. **Fusion Range Limit:**
		3. **Applications:**

**Silver Solders :**

1. **Composition:**
2. **Fusion Range:**
3. **Applications:**

**FLUX:**

**Purpose:**

**Types according to activity:**

**1.**

**2.**

**3.**

**MODE OF SUPPLY:**

**PRECAUTIONS:**

**HEAT SOURCE:**

**1. Gas-air or Gas Oxygen Torch:**

**Types of Fuel:**

 **Hydrogen:**

 **Natural Gas:**

 **Acetylene :**

 **Propane :**

**2. Oven (Furnace) Brazing :**

**TECHNIQUE:**

 **Grade Signature of instructor**

**NOTES**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**NOTES**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**NOTES**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**NOTES**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_