

## **PROVISIONAL CROWN AND BRIDGE MATERIALS**

### **Col David Charlton**

Provisional (temporary) restorations used in fixed prosthodontics are important to the overall success of the treatment. To be considered acceptable, provisional restorations should exhibit several characteristics (see list below). First, they should adequately protect the pulp by completely covering prepared tooth structure and providing thermal insulation. They should protect margins and prevent leakage by forming an intimate seal with the prepared tooth. Provisional restorations should also maintain space by providing stable interproximal and occlusal contacts. Maintaining contacts helps the patient function during treatment. Finally, they should exhibit a good shade match and have a highly polished surface so they are esthetically pleasing to the patient.

#### **Basic Requirements of Provisional Restorations**

1. Provide pulpal protection
2. Ensure marginal seal
3. Maintain positional stability
4. Provide for patient comfort, esthetics, and phonetics
5. Provide occlusal function
6. Promote periodontal health
7. Have minimal shrinkage/distortion
8. Be adequately strong
9. Be sufficiently retentive
10. Have an adequate level of radiopacity
11. Be easy to mix and manipulate
12. Be easy to trim
13. Be color stable

Although provisional restorations can be made using prefabricated metal or polycarbonate crowns, this handout will only discuss acrylic and resin materials used to custom-fabricate provisional restorations.

Materials used to fabricate provisional restorations can be classified as acrylics or resin composites. Subcategories are based on method of polymerization (e.g., chemically activated, light activated, dual activated).

#### **Acrylics**

These materials have been used to make provisional restorations since the 1930s and usually consist of a powder and liquid. They are the most commonly used materials today for both single-unit and multiple-unit restorations. In general, their popularity is due to their low cost, esthetics, and versatility. They produce acceptable short-term (i.e., three months) provisionals but tend to discolor over time. Other disadvantages include an objectionable odor, significant shrinkage and heat generation during setting, and messiness during mixing. The three types of acrylics are polymethyl

methacrylates, poly-R' methacrylates (where R' represents either ethyl, vinyl, or isobutyl groups), and epimines.

Polymethyl Methacrylates

Examples include Jet (Lang), Alike (GC America), Temporary Bridge Resin (Dentsply/Caulk), Neopar (SDS/Kerr), and Duralay (Reliance).

Advantages	Disadvantages
+low cost +good wear resistance +good esthetics +high polishability +good color stability	-significant amount of heat given off by exothermic reaction -high degree of shrinkage (about 8%) -strong, objectionable odor -short working time -hard to repair -must be mixed -radiolucent

Poly-R' Methacrylates (R' = ethyl, vinyl, isobutyl)

Examples include Snap (a polyethyl methacrylate from Parkell), Splintline (a polyethyl methacrylate from Lang), Trim II (a polyvinyl methacrylate from Bosworth), Provisional C&B Resin (a polyvinyl methacrylate from Cadco), and Temp Plus (a polyisobutyl methacrylate from Ellman).

Advantages	Disadvantages
+low cost +less heat given off during reaction than polymethyl methacrylates +less shrinkage than polymethyl methacrylates +extended working time	-less esthetic than other currently-marketed materials -poor wear resistance -poor color stability -strong, objectionable odor -hard to repair -must be mixed -radiolucent

Epimines

These were the first two-paste acrylics, commercially introduced in 1968 as Scutan (ESPE). Although Scutan had relatively low shrinkage and heat production, it was weak and could not be altered or repaired.

**Bis-Acryl Composites**

Bis-acryl provisional materials are resin composites and represent an improvement over the acrylics because they shrink less, give off less heat during setting, and can be polished at chairside. Conveniently, the majority of these products are provided in

cartridges for use in an automix dispenser gun. However, there are at least two types of guns for provisional materials, so you should not assume compatibility between one manufacturer's cartridges and another manufacturer's gun. Provisionals made with bis-acryl resins can be polished to a smooth finish, but are generally not glossy like the acrylics. They also have a pronounced air-inhibited layer that should be removed (usually with alcohol-saturated gauze) prior to finishing and polishing. Although they are provided in fewer shades than the acrylics, they can be characterized using flowable or traditional resin composites. The bis-acryl composites can be subcategorized according to method of activation (e.g., chemically activated, visible light activated, or dual activated).

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>+less shrinkage than acrylics</li> <li>+minimal heat generated during setting reaction</li> <li>+relatively high strength</li> <li>+minimal odor</li> <li>+excellent esthetics</li> <li>+most products use automix delivery</li> <li>+can be repaired or characterized using resin composite</li> <li>+easy to trim</li> <li>+good color stability</li> <li>+radiopaque</li> </ul>	<ul style="list-style-type: none"> <li>-greater cost than acrylics</li> <li>-some do not have a rubbery stage</li> <li>-viscosity cannot be altered</li> <li>-sticky surface layer present after polymerization</li> <li>-may be more brittle than acrylics</li> </ul>

### Chemically-Activated Composites

Chemically-activated resin composite provisional products include Protemp 3 Garant (3M ESPE), Integrity (Dentsply/Caulk), Temphase (SDS/Kerr), InstaTemp (Sterngold), and Luxatemp (Zenith/DMG).

#### *Specific Product Information*

*Protemp 3 Garant* is available in four shades (A1, A3, B0.5, B3). A specially designed dispenser syringe of AddOn, a low-viscosity light-cured resin, is also included with the product. AddOn is used to correct voids or defective margins of the provisionals. Provisional restorations made with Protemp 3 Garant are said to be more fracture resistant than those made with other composite products. 3M ESPE also claims that the restorations have excellent marginal adaptation and are fast and easy to polish.

*Integrity* is available in three shades (A1, A2, A3.5). Two sizes of mixing tips are available: a small size for single-unit temporaries and a larger tip for multiple temporaries and fixed partial dentures. The product has a snap set and should be used expeditiously; place it in the mouth within 45 seconds and remove it in another 45 seconds.

*Temphase* is filled 41 percent (presumably by weight) with silica and silane-treated barium glass particles. Its small (0.6-micron) average filler particle size is reported to make it easy to polish and provide excellent esthetics. Among its other claimed advantages are easy repairability (with a supplied flowable resin composite) and a viscosity that prevents slumping. The product is available in five shades (A2, A3.5, B1, C2, D2) and two setting times (3-minute Fast and 5-minute Regular). Included with *Temphase* is a syringe of separating gel that is used when *Temphase* is placed over a core or liner of resin or glass ionomer to prevent the surfaces from adhering as *Temphase* cures.

#### Visible Light-Activated (VLA) Composites

Very few provisional materials are available that are polymerized solely by exposure to a light curing unit. One, however, is Revotek LC, introduced by GC America in 2002.

#### *Specific Product Information*

*Revotek LC* is a VLA, single-component, sculptable resin composite. It is supplied in a Putty Stick form in a lightproof plastic tray. To make a provisional restoration, a small portion of the material is cut from the stick and adapted to the preparation directly in the mouth. It is then sculpted using hand instruments after which the patient is instructed to occlude into it to establish a functionally-generated occlusal scheme. The *Revotek LC* provisional is then light-activated for 10 seconds in the mouth, removed, and given a final 20-second light exposure. After finishing and polishing, the restoration is cemented with a temporary cement. *Revotek LC* is available in only one shade (B2).

#### Dual-Activated Composites

One example is Unifast (GC America), which goes through a chemically-activated, rubbery, setting stage and is then VLA for final set. Other such products have appeared in the past such as TempCare (3M) and Provispont DC (Ivoclar Vivadent) but have since been discontinued.

#### Cited References

1. Custom temporary materials. Adept Report 1997;5(3):1-41.
2. Iso-Temp Temporary Material, Technical Product Profile, 3M, St. Paul, MN, 1997.

#### Uncited Reference

Custom Provisional Restorative Materials. Available at [http://nnd40.med.navy.mil/Gen\\_Dent/Gen\\_Dent/Pearlsa9.htm](http://nnd40.med.navy.mil/Gen_Dent/Gen_Dent/Pearlsa9.htm). Accessed 26 Mar 02.