• Phosphate-bonded investments

A **dental investment** is a refractory material that is used to surround the wax pattern during the procedure of fabricating the metallic permanent restoration. It **forms the mold** into which the alloy is cast after the wax has been eliminated.

An investment material to be used for a casting mold should expand on setting and heating to compensate for the shrinkage of molten metal as it solidifies. Metal casting alloys have different melting ranges — only pure metals and alloys of eutectic composition have a melting point. The melting range of gold casting alloys (approx. 900° C) is lower than that of Co-Cr alloys (approx. 1350° C). Therefore, investment materials used for gold casting alloys are sometimes different from those used for Co-Cr alloys. The investment material should be of a suitable consistency for adaptation to the wax model and have a reasonable setting time. To withstand the temperatures required for the casting process there should be no distortion, no decomposition; the investment should not fragment or disintegrate under the impact of the molten metal; the material should be porous to allow the escape of air and gases and the investment should be easily removed from the casting after cooling.

Classification of Dental Investment Materials

- **Gypsum-bonded** investments: **binder** is **gypsum** (calcium sulfate hemihydrate). Used when casting **conventional gold alloys** containing 65% to 75% gold at temperatures near 1,100°C.
- **Phosphate-bonded** investments: **binder** is a metallic oxide and a **phosphate.** Two types: **Type I is** used when casting **base metal alloys** for metal-ceramic crowns and **Type II** is used for removable partial denture frameworks. Are capable of withstanding high temperatures (above 1,100°C).
- **Silica-bonded** investments: **binder** is ethyl silicate. Not used much today.

The **refractory material** for these investments is either quartz or cristobalite. This material provides the thermal expansion for the investment. **Note:** The expansion of the investment provides a larger mold **to compensate** for the subsequent contraction of the alloy.