Dental Materials

Investmetn Materials

Dr.Azhar Alawadi

Investment:

Investing:
It is the process of covering or enveloping an object with a suitable investment material before processing.

Investment material:
is the material which is placed around the wax pattern and permitted to harden, to be, after wax elimination, the mold into which the metal is centrifuged. It is ceramic material used to form a mold which an alloy is casted.

Requirements of an ideal investment material:

1. Easy to use & reasonable setting time.
2. Sufficient strength at room temp. & at high temp.
3. Must not decompose at high temp.
4. Should have enough expansion to compensate for the shrinkage of wax & metal.
5. Should be porous to allow air & other gases to escape.
6. Should produce smooth surface & fine details.
7. Should break easily after casting is completed.
8. Should be inexpensive.

Types:

1. Low temperature casting investment: Gypsum-bonded investment
2. High temperature casting investment: phosphate-bonded investment

Ethyl silicate-bonded investment

Each type of investment should compose of:

1. Refractory material like silica dioxide such as quartz. Materials that will withstands very high temperature. The silica is responsible for the production of expansion to compensate the shrinkage of the alloy during casting.
2. Binder: the refractory material alone doesn't form a solid mass & this is why the binder is needed. Alpha calcium Sulphate hemi-hydrate is the binder for gypsum-bonded. Phosphate is the binder for phosphate-bonded investment. Ethyl silicate is the binder for ethyl-silicate-bonded investment.
3. Modifiers: to modify the physical properties.

A. Gypsum bonded investment:

Uses: it is used to form mold for casting gold alloy for crown & bridges.

Manipulation: the powder is mixed with water & poured around wax pattern & allowed to set.

Properties:

1. It will decompose to sulfur dioxide & sulfur trioxide when heated above 700 ºC which will lead to corrosion of this alloy; therefore, it is not used for casting chrome cobalt or palladium alloys but used for gold alloy
2. It has three types of expansion: setting, thermal & hygroscopic expansion

B. Phosphate bonded investment:

Uses: to form mold for casting high temperature dental alloys like chrome cobalt.

Manipulation: It is composed of powder & liquid; powder is 80% silica dioxide & liquid is either colloidal silica suspension or water. The powder is mixed with the liquid & poured around the wax pattern & allowed to set.

C. Ethyl silicate bonded investment:

The same uses as phosphate bonded investment. It is composed of powder which is silica dioxide & magnesium oxide while the liquid is supplied into 2 or 3 liquid systems mixed to form solution then the powder is mixed with it. The liquid is composed of ethyl silica.