What is INVESTMENT?

- A castable REFRACTORY plaster-like material
- Used to make MOLDS for casting alloy into
- Used to make MOLDS for pressing ceramic into
Or...Powdered stuff in bags

TYPICAL GYPSUM INVESTMENT

PHOSPHATE BONDED INVESTMENT
There are TWO main types of Investment used in dental labs

- **Gypsum bonded investments**
  - Low temperature (<1200°F burnout)
  - Only suitable as casting investment (no pressing)
  - Only used with Crown and Bridge (full cast) alloys e.g. JRVT, JCB
    - e.g. Beauty-cast, Novacast, Degussa California

- **Phosphate bonded investments**
  - High temperature (up to 1700°F burnout)
  - Phosphate casting investments can be used with C&B and PFM alloys
  - All Pressing investments are Phosphate bonded
  - Microstar HS, HS-PC, and Partial Plus are Phosphate bonded
Gypsum bonded investments

- Are not common these days.
- Are much WEAKER and SOFTER than phosphate investments.
- Usually provide a smoother casting than phosphate investments.
- Today, widely considered a specialty product for high precision gold castings such as Tucker technique.
Phosphate bonded investments

- Are the workhorse products of the modern dental lab
- Are more versatile as casting investments
- SOME phosphate investments can be used for both PRESSING and CASTING
- SOME phosphate investments can utilize a rapid burnout or “rush” technique
- MOST phosphate investments are strong enough for a ringless technique
This is what HS rings look like:

This is what a ring of Prestobalite looks like:

Casting ring

Pressing ring
Investments contain CRYSTALLINE SILICA

- Can cause the lung disease SILICOSIS
- Silicosis is VERY BAD to have
- Refer to MSDS for guidance on safe handling
How it’s used

Open the pre-weighted bag
Measure your liquids

- Distilled water for gypsum investments
- Water plus “special” expansion liquid for phosphate investments
Put the liquid in the bowl
Add the powder
Hand mix according to directions
Vacuum mix as directed
Pour the mix into the ring

Metal casting ring, gypsum bonded investment and ring liner

Flex ring for press ceramic, HS investment
Bench set...No picture here. Kinda like watchin' grass grow.

BUT...this is a CRITICAL STEP. The investment changes from a wet mix of goo to a hard, strong solid. Like Magic!

While it's setting, it gets HOT and it EXPANDS. This is important, so remember it.
Burnout – two ways to do it

- Slow burnout / overnight technique / conventional technique
  - Bench set until ring has cooled down
  - Put cold ring in cold oven
  - Slowly heat to intermediate temperature and soak
  - Continue heating until final temperature and soak

- Call it “two stage” burnout because you heat and soak, heat and soak

- Rates, soak times, and 1st stage temp are dictated by investment manufacturer

- Final temp dictated by alloy manufacturer
And the other way to burnout...

- Is called RAPID burnout, High Speed burnout, or Rush technique
- After a very SPECIFIC AMOUNT of bench set, and while ring is still hot, you pop it right into a preheated oven
- No, it doesn’t explode. Not usually, anyhow.
After burnout, you cast or press, and recover your part.

SIMPLE, right?

...Uh...not exactly.
Investments play a CRITICIAL role in

- The efficiency of the lab
- The quality of the restorations
- The success or failure of new systems
Investments are possibly the most technique critical materials used in the dental lab.

Investments may be the most variable material used in the dental lab.

Investments take the blame for an awful lot of problems in the dental lab...for right or wrong.
- When investment sets, there is a volume expansion. Call this “Setting Expansion”.

- When you put the ring in an oven and heat it up, it expands more. This is “Thermal Expansion”.

- How much it expands will dictate the ultimate size of the final casting or pressing. Investment expansion controls the final fit of the restoration.
For phosphate bonded investments, all these factors affect expansion.

- Ratio of expansion liquid to water
- Ratio of powder to liquid
- Temperature of liquid
- Mixing time
- Mixing speed
- Mixing quality
- Bench set time
- Burnout temperature
- Age of powder
- Age of liquid
- Characteristics of powder (batch-to-batch variation)
- Characteristics of liquid (batch-to-batch variation)
But wait there’s more!

Hardness of the wax
Thermal expansion of material being formed
Type of ring the investment is cast into

All effect the final size of the restoration too.
Investments are all about **CONSISTANCY**

- From bag to bag, bottle to bottle
- From technician to technician
- From day to day, month to month