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# PlasterMix YY Casting Powder

## Powder Refractory Mixture for Forming Slurry for Plaster-like Casting

Plastermix YY is an all-Yttria based plaster-forming mixture, which on merely adding water and stirring, becomes like Plaster-of-Paris that can cast into silicone forms to make "investment" molds or porous shapes or even be applied like stucco to firebrick.

### Key Attributes

- Uses Yttrium Oxide as the cementitious phase for forming plaster
- Readily forms slurry with working behavior like Plaster-of-Paris
- Slurry can be cast for forming shapes or "investment" molds
- Provides mixing/working time of over 10 minutes before setting begins and up to an hour before completely setting up as plaster
- Heating to 800-1400 C provides a well-bonded, free-standing shape
- Sandable after drying or firing
- Yields crack-free thick dried or fired pieces
- Water-based, safe and easy to use or cleanup
- Contains no Refractory Ceramic Fiber (RCF), no sulfur, no silica

### Ideal Use

- Forming "investment" molds for casting very reactive molten metals
- Providing a stable porous (typically<sup>1,2</sup> 50-65% porous, with pore diameter 0.5-2 microns) refractory part based on Yttrium Oxide
- Forming a weakly-bonded, highly-stable refractory stucco/plaster on firebrick and porous substrates

### Use Notes

1. Add powder to mixing container. Add water and stir until uniform. Note that the slurry will become cool and then somewhat warm and thicken some before thinning back out as time goes over five minutes.
2. Generally at <10 minutes or so, cast the slurry into silicone form/mold as a thin liquid and 'set' for about one hour. Any excess liquid will form on top and can be tamped off with a paper towel during the hour. Continue to "set" for 1-2 more hours.
3. Place into dryer at 60 C overnight, and then remove from the silicone form/mold. Allow to dry further for 1-2 hours.
4. Place into furnace to fire to desired temperature, generally 800 to 1400 C.

**Example:** 50 grams of powder is mixed with 15 cc of water for forming a slurry to fill a 25 cc silicone form/mold, such as cylinder 4 cm diameter and 2 cm high. After 60 C drying, typical heating rate was 100 C/hr to 600 C, 250 C to 600-1000 C, then 600 C/hr to 1000-1400 C with "soak" of 0.5 hr.

Large parts require slower heating rate to upper temperature (such as 6 C/hr to 650 C, 50 C/hr 650-800 C, 120-600 C/hr 800-1400 C.

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### Specifications

Active Ingredient	Yttrium Oxide
Max Use Temperature with All Atmospheres	>= 1400 C (2552 F)
Fired Composition	>92% Y <sub>2</sub> O <sub>3</sub>
Liquid Carrier	Water
Binder Phase	Proprietary
Specific Gravity	2.0
Color	White
Shelf Life (months)	Indefinite ... but avoid getting wet before use
H F R Ratings	1-0-0

### Sizes and colors

Plastermix YY is a white colored powder mixture. Standard Size: 8 oz. or 32 oz. (quart) clear plastic container

### Safety Information

- Consult SDS before use.
- For Industrial Use only.

### References

1. C. E. Holcombe, Jr., "Sintering of Yttria Binders," American Ceramic Society Bulletin, 57, 693 (1978).
2. C. E. Holcombe, C. C. Edwards, and D. A. Carpenter, "New Yttria Plasters," Report Y-2104, Dept. of Energy, Oak Ridge Y-12 Plant, Oak Ridge, Tennessee (1978).