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## ZAP Binder

### Water-based, Acidic pH Binder Liquid For Creating Your Own Paint

ZAP Binder is a water-alcohol-based binder liquid. ZAP Binder produces high hardness coatings on heating to 350 C ... with relatively high water resistance. The binder has a low ability to suspend solids and generally produces low viscosity coatings with most refractory powders. With a pH of 2-3 (like lemon juice), careful consideration should be used concerning whether the powder to be used is stable in an acidic medium. Other properties – relatively short shelf life of 3-6 months; used in all atmospheres to 1600 C.

#### Key Attributes

- Water-resistant after thorough drying [150-350 C for complete water insolubility]
- Forms very tough phosphate-silicate bond
- Low suspendability of 'filler' powders
- Forms high hardness coatings
- Good in all atmospheres, including air
- Outgassing (H<sub>2</sub>O, NO<sub>x</sub>, CO<sub>x</sub>) - complete by 600 C
- Safe, water-based • No cure needed

#### Ideal Uses

- Binder/Suspender
- Infiltrant
- Sealer of surfaces with fibers, dust
- Rigidizer for ceramic fabrics/blankets

#### Possible Fillers

- Al<sub>2</sub>O<sub>3</sub>, ZrO<sub>2</sub>, TiO<sub>2</sub>, Si<sub>3</sub>N<sub>4</sub>, TiN, BN, & pH-Acidic stable materials
- Consider eutectics

#### Use Notes

1. Add refractory 'filler' (<10 microns preferred)
2. Start at 50wt.% powder. Mix by rolling/shaking.
3. If too thick, add water; if too thin, add powder.
4. Re-mix by rolling or shaking.

After making paint above, clean substrate, apply paint, dry (with no cure needed), and place into use.

SPECIAL NOTE: Blending HPC Binder with LK Binder increases the hardness and water-resistance<sup>1,2</sup>



#### Specifications

Active Ingredients	>99% Al <sub>2</sub> O <sub>3</sub> -P <sub>2</sub> O <sub>5</sub>
Max Use Temperature	1600 C
Use Atmosphere	All
Fired Composition	52.5% P <sub>2</sub> O <sub>5</sub> – 46.5% Al <sub>2</sub> O <sub>3</sub>
Binder Phase	Aluminum Phosphate
Hardness	Low-Medium
Liquid Carrier	Water/Ethanol
Water Resistance, after 150-350 C	High
Ability to Suspend Solids	Low
Brookfield Viscosity (cps)	90 @2/60
Specific Gravity	1.2
Shelf Life (months)	3-6
Coating pH	2-3
H F R Ratings	1-1-0
Substrate Use	All
% Volatiles	76

#### Safety Information

- Consult SDS before use.
- Avoid breathing of spray/vapors.
- For Industrial Use only.

#### Sizes and colors

ZAP Binder is a slightly-cloudy liquid.  
 Standard Size: 1 gallon Nalgene container.

#### REFERENCES:

1. <https://technicalreports.ornl.gov/cppr/y2001/pres/118132.pdf>
2. <https://technicalreports.ornl.gov/cppr/y2001/pres/112315.pdf>

#### CAUTION: DO NOT CONTACT WET COATINGS WITH MOLTEN METAL.

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