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## LK Binder

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

LK Binder has a moderate ability to suspend solids. It yields a ternary composition  $\text{Li}_2\text{O}-\text{K}_2\text{O}-\text{SiO}_2$  that bonds together the 'filler' solids added to the binder. This water-based, pH-Alkaline/Basic binder/suspension-agent is usable to around 800-900 C in all atmospheres, but this use-limit can be extended with different filler materials. Also, with combining LK Binder with HPC Binder in any proportion, the upper use limit can be extended, for example as demonstrated to over 1400 C with rare earth phosphors<sup>1,2</sup>. LK can be used with any powder solids that are stable in an alkaline pH medium. Coatings made with LK have the unique ability to become water-insoluble after being heated to 100-150 C at which all outgassing (water only) is also complete.

#### Key Attributes

- Water-insoluble after heating to 100-150 C
- Forms very tough silicate bond
- Moderate Suspendability of 'filler' powders
- Forms high hardness coatings
- Good in all atmospheres, including air
- Minimal outgassing ( $\text{H}_2\text{O}$ )-- complete by 150 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

- $\text{Y}_2\text{O}_3$  and all Rare-Earth Oxides (see refs. 1, 2),  $\text{TiO}_2$ ,  $\text{Al}_2\text{O}_3$ ,  $\text{ZrO}_2$ ,  $\text{ZnO}$ ,  $\text{Si}_3\text{N}_4$ , Y-SiAlON, & many more
- 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 LK Binder with HPC Binder improves suspendability of filler material and extends the use limit well over 1000



#### Specifications

Active Ingredients	>99% $\text{Li}_2\text{O}-\text{K}_2\text{O}-\text{SiO}_2$
Max Use Temperature	900 C (extended to >1400 C if mixed with HPC Binder)
Use Atmosphere	All
Fired Composition	5% $\text{Li}_2\text{O}$ - 20% $\text{K}_2\text{O}$ - 75% $\text{SiO}_2$
Binder Phase	Lithium Potassium Silicate
Hardness	High
Liquid Carrier	Water
Water Resistance,	
After ambient-temperature drying	Moderate
After 100-140 C	High
Ability to Suspend Solids	Moderate
Brookfield Viscosity (cps)	15 @1/60
Specific Gravity	1.19
Shelf Life (months)	>12
Coating pH	9-10
H F R Ratings	1-0-0
Substrate Use	All
% Volatiles	79

#### Safety Information

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

#### Sizes and colors

LK Binder is a clear liquid with water-like viscosity. Standard Size: 1 gallon Nalgene container.

#### REFERENCES:

1. <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.545.9591&rep=rep1&type=pdf>
2. <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.202.8627&rep=rep1&type=pdf>

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

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