CAB-O-SPERSE® DISPERSIONS
FOR INK RECEPTIVE COATINGS ON NONPOROUS SUBSTRATES

Why CAB-O-SPERSE dispersions in ink receptive coatings?

The function of an inkjet receptive coating is to allow an inkjet compatible layer to sit on top of substrates that are either too porous or too non-permeable to be coated with other types of formulations.

CAB-O-SPERSE fumed silica or alumina aqueous dispersions enable key performance benefits for this application including:

1. Improved and consistent performance:
   - High absorptive capacity
   - Fast drying characteristics
   - Good substrate adhesion
   - Excellent image quality and gloss

2. Processing ease:
   - Pre-dispersed particles allow easy incorporation
   - CAB-O-SPERSE products can be selected to optimize stability in formulation

3. High purity:
   - Good chemical and temperature stability without yellowing
   - Dispersant-free to minimize incompatibility and aid formulation flexibility

The unique morphology and surface charge of our silica and alumina particles determines the beneficial properties imparted to nanostructured ink receptive coatings. The porosity, pore size distribution, and surface charge of the coating – which are critical for coating adhesion, ink and coating drying time, ink capacity, color intensity, color gamut, and dot gain– can all be tailored by formulation and choice of materials.

Water management: enhance drying

CAB-O-SPERSE dispersions in coatings formulations create submicron pores, which decrease the drying time exponentially due to the Kelvin effect, resulting in orders of magnitude faster drying, faster print speeds, and less energy spent drying the coating and printed image.

Substantially improved color gamut

The control over pigment or dye spatial deposition enabled through adding CAB-O-SPERSE dispersions to the formulation results in significantly increased color gamut in the final printing/coating. This enables custom color printing and brand extension.

- The porosity of the coating is determined by the fumed silica/alumina to binder weight ratio.
- Coating pore size gives pigment or dye spatial control on a nanoscale level.
- Fumed silica/alumina-to-binder ratio gives formulators control over coating morphology.

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**Finger wipe after 45 seconds**

<table>
<thead>
<tr>
<th>No silica dispersion</th>
<th>With silica dispersion</th>
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</table>

With CAB-O-SPERSE silica dispersion in the coating formulation, the coating and ink dries in seconds. Without the addition of CAB-O-SPERSE dispersion, drying takes hours (and hours).

**Ink drying time**

<table>
<thead>
<tr>
<th>No silica dispersion: test stopped at 500 s</th>
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</thead>
<tbody>
<tr>
<td>Fumed alumina / polyurethane</td>
</tr>
<tr>
<td>Fumed alumina / polyacrylate</td>
</tr>
<tr>
<td>Fumed silica / polyurethane</td>
</tr>
<tr>
<td>Fumed silica / polyacrylate</td>
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</tbody>
</table>

**Total gamut in test formulation**

In the order of: Y M C G B K (CMY)
Top row: Premium photographic paper for inkjet
Bottom row: Fumed silica - polyacrylate

**Color gamut a* b* plot**

Premium photographic paper for inkjet
Fumed alumina / polyurethane
Fumed alumina / polyacrylate
Fumed silica / polyurethane
Fumed silica / polyacrylate
**Color retention in water**

Ink receptive coatings formulated for paper substrates are not waterfast on nonporous substrates due to presence of water soluble binders such as polyvinyl alcohol. However, with appropriate resins, printed images are able to retain their entire color gamut, even after immersion in water for ten minutes.

Demonstration of color fastness in water on nonporous substrate without CAB-O-SPERSE dispersions in substrate coating

Watch the videos online at: [http://www2.cabotcorp.com/cabosperse-coatings](http://www2.cabotcorp.com/cabosperse-coatings)

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**Sample ink receptive coating formulations**

A high performing ink receptive coating needs to have two major components:

- A porous structure forming agent to handle liquid: CAB-O-SPERSE fumed silica/alumina dispersions are excellent porosity formers
- A charge diminishing mechanism to fix the pigment particles: CAB-O-SPERSE grades provide surface charges that can effectively alter the stability of color pigment

The wide range of CAB-O-SPERSE products provides ample options to optimize formulations.

- High compatibility because there are no dispersants
- Range of materials: Silica or alumina base
- Wide range of particle size
- Controllable surface charge via choice of particles or pH
- Robust dispersion: high zeta potential over range of pH

**Some formulation best practices to consider:**

- Establish film and print quality based on the example starting formulation on the right, then adjust if needed to balance coating quality and print performance
- Avoid using a particle dispersion with a resin with opposite charge: neutral resins can be used with either positively charged or negatively charged particle dispersions

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