

TECHNICAL & COMMERCIAL BRIEF

Active HC™ Dust Suppression

Higher Durability • Water-Efficient • Low-Maintenance • Engineered for Performance

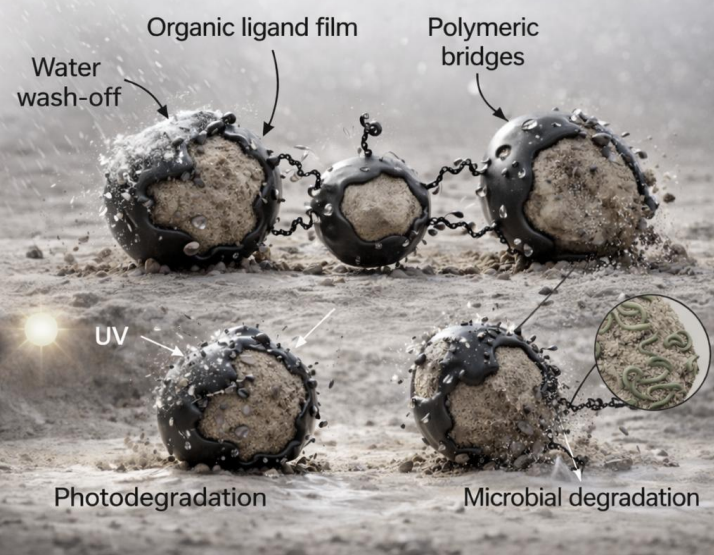


Standard organic binders (lignosulfonates, polymeric binders, surfactant/ligand systems) act primarily by forming an **adsorbed organic film** on mineral particles that binds fines together. These films are effective initially but are typically **water-soluble or water-sensitive** and must be reapplied after significant rainfall.

Active HC™ (organic polymer) operates by a combination of **hygroscopic moisture retention** and **electrochemical modification** of the particle surface. Organic polymer ions (especially divalent cations if present) **specifically adsorb** to mineral surfaces, compress the electrical double layer and produce ion-bridging (coagulation/flocculation). This yields a deeper, ionic “anchoring” (**the adsorbed / Stern layer**) plus a compressed **diffuse layer** — together producing a more persistent dust-suppressing structural state.



How Organic Ligand Dust Suppression Works



How organic “ligand” systems work (and why they need frequent re-application)

Organics form a surface film and polymeric bridges that increase adhesion but remain water-sensitive and prone to biodegradation, photodegradation and abrasion.

They do not materially alter ionic strength or the diffuse layer, so the film is readily lost and must be re-applied.

The particle-surface environment

Particles carry a negative surface charge neutralised by a Stern (adsorbed) layer and a diffuse layer; ionic strength controls the diffuse-layer thickness (Debye length) and zeta potential.

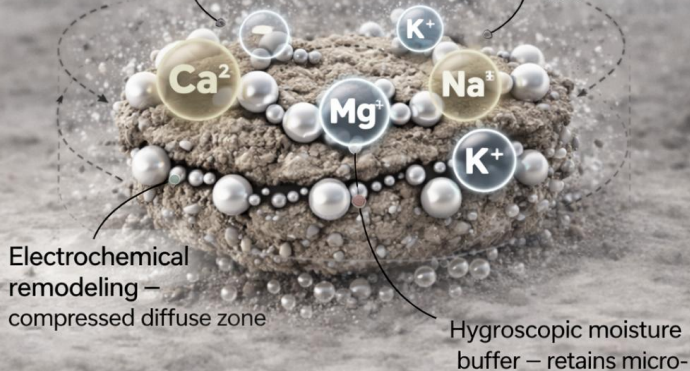
Multivalent cations efficiently neutralise charge and form bridges, promoting irreversible aggregation at short range.



How the Active HC™ Dust Suppression Works

Specifically adsorbed cations (Ca^{2+} , Mg^{2+} , Na^+ , K^+) – cationic bridges

Hygroscopic moisture buffer – retains micro-film



- ✓ Resists water wash-off and abrasion
- ✓ Low biological and photolytic loss

Why Active HC™ needs fewer re-applications

Active HC™ is organic polymer-based: ions specifically adsorb to mineral sites (inner-sphere adsorption) and compress the electrical double layer, producing durable ion-bridges.

Its hygroscopic salts retain bound moisture and resist microbial/UV breakdown, so cohesion persists after normal wetting and abrasion.



Application Methodology

1. Pre-treatment and preparation
2. Moisture pre-conditioning
3. Formulation selection & batch preparation
4. Placement in uniform application
5. Penetration & consolidation
6. Curing and verification
7. Routine monitoring



Quality Assurance

- Runoff & leachate control
- Corrosion & materials protection
- Worker safety
- Record keeping
- Performance review

ARC INNOVATIONS

**Active HC™ — Ion-anchored, hygroscopic dust suppression:
durable, water-efficient and low-maintenance.**

A organic polymer-based system that raises near-surface ionic strength to compress the electrical double layer and promote specific (inner-sphere) ion adsorption and ion-bridging. Combined with strong hygroscopic moisture buffering, this creates a chemically anchored Stern layer plus an ion-rich diffuse zone that delivers far greater particle cohesion and persistence after wetting than conventional organic ligand films.



ARC INNOVATIONS



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