BORON MOLECULAR

METAL-ORGANIC FRAMEWORKS

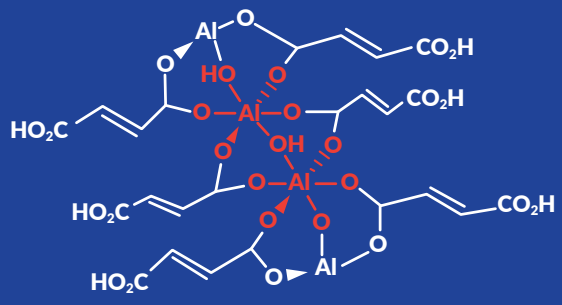
ALUMINIUM FUMARATE

Water capture and dehumidification of climate-controlled areas are typically performed in energy intensive processes with single use materials, or those that are difficult to regenerate. While these materials are effective in capturing water, the inability to recycle these materials efficiently, limits their applicability.

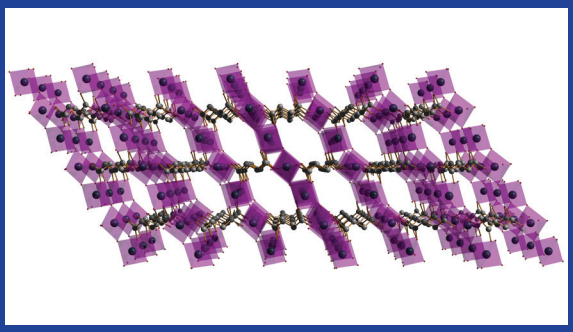
Aluminium Fumarate (Al-Fum) is a non-hazardous water capture material that can be regenerated under very favourable conditions. Al-Fum is from a family of materials called Metal-Organic Frameworks (MOFs) which exhibit ultrahigh microporosity and surface area. This high surface area allows for a large amount of water or other guest molecules to be attracted to the surface of the framework. Al-Fum is also well suited for water capture due to its remarkable moisture and thermal stability that further prolongs the lifespan of the material in use.

Potential applications include: water vapour capture (e.g. dehumidification, water harvesting); methane capture (e.g. capture of fugitive methane emissions from landfill); CO_2 capture (e.g. post-combustion capture of CO_2 from power plants); and adsorption heat pump (e.g. use in refrigeration cycles, efficient air conditioning).

Aluminium Fumarate



Al-Fumarate repeat unit



Al-Fumarate lattice

TECHNOLOGY FEATURES

- High porosity (~0.66 cm^3/g)
- High surface area (~1000 m^2/g)
- Thermally stable up to ~400°C
- Pore size suitable for water vapour
- Moisture stable
- Readily produced in appropriate form factors
- Bulk quantities available

CUSTOMER BENEFITS

- Cheaper to operate with respect to material lifespan and energy cost.
- Al-Fumarate along with other MOFs are reusable.
- Less energy intensive in regenerating MOFs when compared to zeolites.
- Safer than LiCl which can leach and damage equipment.
- Stability in humid environments.
- Wide operating range for humidity.

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