



HIGH PERFORMANCE COATINGS WITH LEVULINIC ACID

Levulinic acid from GFBiochemicals A green future for coatings

- **Levulinic acid** improves processability and reduces VOC in coatings such as latex and polyester
- **Diphenolic acid** (DPA), a derivative, can replace bisphenol A (BPA), providing additional functionality, crosslinking and durable impact resistance
- **1,4 PDO** derived from levulinic acid improves the durability of polyester coatings

Improve the performance and biobased content of your coatings with GFBiochemicals' levulinic acid, produced directly from biomass.

Levulinic acid improves the processability and film strength of waterborne polyurethane and polyurethane acrylics such as latex and polyester coatings. For instance, in printing inks and wood coatings. It enables curing at room temperature and can also reduce the volatile organic compounds (VOC) from resins.

Further application benefits are made possible by replacing fossil-based products with levulinic acid derivatives.

DPA is used in protective and decorative finishes. It offers epoxy coatings with additional functionality, crosslinking and durable impact resistance with minimum risk of material migration, in comparison to BPA which has properties of concern. DPA is easily made from levulinic acid and will be far more attractive at the price range enabled by GFBiochemicals.

1,4-pentanediol (1,4 PDO) can be obtained from levulinic acid via hydrogenation. Cost-competitive 1,4 PDO from levulinic acid has additional environmental and safety advantages due to reduced potential leaching. In polyester coatings, it offers improved durability. 1,4 PDO also has potential as a monomer for polyurethanes.



Levulinic acid esters can replace solvents of concern like dimethylformamide (DMF), dimethylacetamide (DMA) and N-methylpyrrolidone (NMP) in coatings.

4,4'-azobis (4-cyanovaleric acid) is a common initiator for RAFT (Radical Addition Fragmentation chain Transfer) polymerization of free radical reactions for the production of controlled polymers.

Levulinic acid is a versatile building block for chemicals and materials derived directly from biomass.

ABOUT GFBIOCHEMICALS

Founded in 2008, GFBiochemicals uses breakthrough technology to commercialize levulinic acid – a valuable biobased building block for specialty chemicals and materials. With offices in Milan, Italy and Geleen, the Netherlands, its 10,000 MT/a commercial-scale production plant in Caserta, Italy came online in July 2015.



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