

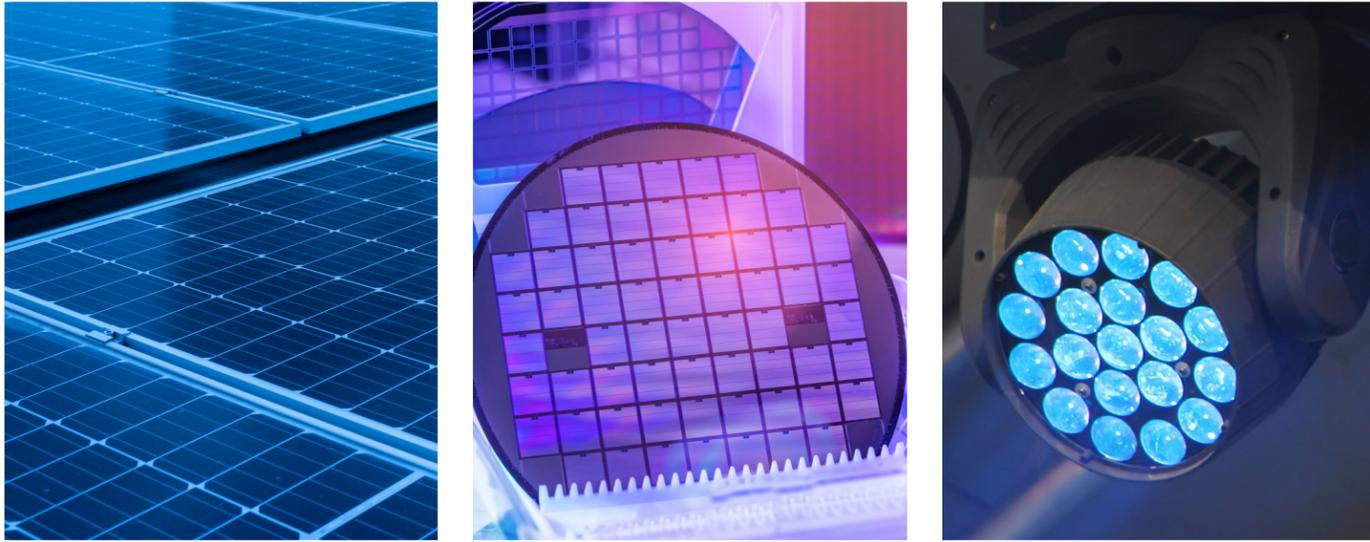
TMA-HP

# Trimethylaluminum *Solutions*

## A Leading Provider of Organometallics

Albemarle provides high quality, critical catalyst products and on-demand technical support to a wide range of synthetic oligomer, polymer manufacturers through our Organometallics division.

Our roots in organometallic chemistry date back to the 1950s. Since then, we have been supplying organometallic, aluminum alkyl products safely and reliably to customers across the globe.



### Developed for Performance

Over the decades, Albemarle has built a solid reputation in organometallic chemistry, analytics, and handling expertise and experience, becoming the world's largest supplier of organometallics. We are constantly pushing the boundaries of innovation, working with our customers to maximize their outcomes and ensure exceptional performance, consistency and reliability.

Our recent breakthroughs in Trimethylaluminum (TMA) production enable us to provide TMA with different purities, which are ideal for semiconductor, solar cell and LED applications and markets.

**In the semiconductor industry,** high purity TMA can be used as an Al precursor in ALD or CVD process to generate Al<sub>2</sub>O<sub>3</sub> thin film as high-k dielectric material.

**In solar cell manufacturing,** high purity TMA can be used to create an Al<sub>2</sub>O<sub>3</sub> passivation layer through CVD or ALD process to increase efficiency of crystalline silica solar cell with proven performance.

**In LED manufacturing,** high purity TMA can be used through MOVPE or CVD to make Al containing compound semiconductors, such as AlGa<sub>n</sub> Epitaxial (EPI) layer, or Al<sub>2</sub>O<sub>3</sub>, AlN passivation layer; therefore, improving optical efficiency and provide better illumination.

Performance  
*you require.*



# The Albemarle Advantage

**At Albemarle, we're not just about chemicals; we're about solutions. Our commitment to sustainability drives every aspect of our organometallics business.**

From production through storage, shipment, handling, and safe use, we're here to elevate your experience. This translates into an intense focus on safety and environmental performance, as well as an active product stewardship program.

**Sustainable Supply.** Albemarle is a large volume producer of Trimethylaluminum (TMA), a key raw material used to produce other metal organic sources for the atomic layer deposition (ALD) or chemical vapor deposition (CVD) portfolio.

**Qualified Safety and Handling Experience.** At Albemarle, safety is our number one priority. We're your 24/7 partner, ensuring that your journey with organometallic compounds is smooth, secure and successful.

Our techniques and equipment have been designed to control the potentially dangerous properties of organometallic compounds.

Additionally, we provide opportunities for customers to learn from our seasoned experts how to safely use our organometallics products.

**Global Reach.** With customers in over 100 countries, Albemarle knows how to deliver quality products worldwide.

**Analytical Capabilities.** Our cutting-edge techniques—Nuclear Magnetic Resonance (NMR), Inductively Coupled Plasma Optical-Emission Spectrometry (ICP-OES), Gas Chromatography-Mass Spectrometry (GC-MS)—ensure that our products meet the rigorous demands of the electronics industry. Precision is our promise.

**Tailored Solutions.** We don't believe in one-size-fits-all. Albemarle collaborates closely with customers to create materials aligned with their unique application requirements.

## World-Class Manufacturing

Albemarle operates the world's largest metal alkyls plant, a world-class, integrated facility located on the Houston Ship Channel in Pasadena, Texas. TMA-HP currently is made at the Process Development Center (PDC) in Baton Rouge, Louisiana, while other TMA grades are manufactured in Orangeburg, South Carolina. The facilities are strategically located near a number of established distribution channels and serve as the cornerstone for our strong global supply chain.



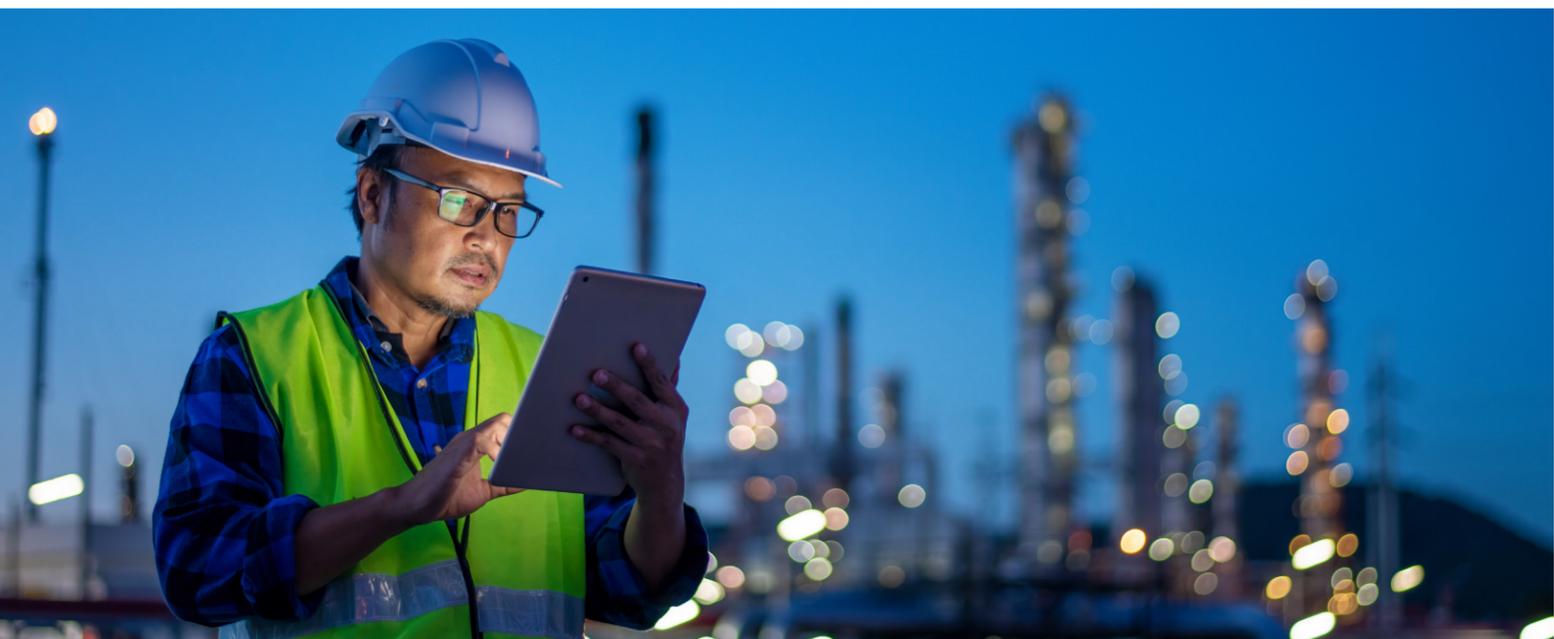
Albemarle has been producing metal organics at these facilities for over 50 years and has established a solid reputation in manufacturing, handling, and shipping these highly volatile products. We have a team of research, development and operations specialists that are dedicated to the continued development, improvement, and commercialization of our metal organics.

## Shipping Containers

Albemarle supplies organometallics either undiluted (neat) or diluted with hydrocarbons (blended). Laboratory cylinders are available in 0.4-gallon and 1-gallon sizes. For slightly larger quantities, 5-, 26- 119-gallon dual-valve cylinders and 500-gallon portable tanks are available. For 26-gallon cylinders and smaller, the container is sold with the product. The 119-gallon cylinders and 500-gallon portable tanks are returnable to Albemarle.

The 0.4- and 1-gallon laboratory cylinders are shipped inside a carton. Both sizes have screw-on caps to protect the valve and can be shipped without further packaging. Laboratory cylinders should be handled in a dry box whenever possible because this is the safest and generally the most convenient way to unload these small containers. However, if a dry box is not available the cylinders can be unloaded with a dip-leg apparatus (available from Albemarle separately).

If the container requires heating, use heated air rather than hot water or steam. Be sure all equipment is free of oxygen and moisture. Proper personal protective equipment must be worn. Be sure to read and understand all procedures (and emergency procedures). Familiarize yourself with handling and safety hazards prior to proceeding with any procedure.





## Handling Procedures for *Enhanced Safety*



Metal organics are a highly volatile, pyrophoric water-reactive substance that must be handled with extreme caution. In order to protect our employees, our customers, and the public, Albemarle has gone to great lengths to develop a series of educational tools to demonstrate safe handling procedures. We offer on-site product stewardship seminars where we educate our customers and the local emergency response agents on the potential dangers and proper handling procedures of metal organics. The seminar also includes a demonstration of proper incident containment and emergency response procedures in the event of a release.

Albemarle also offers a series of operator training courses where our specialists provide technical assistance and input as our customers prepare their facilities and staff for the introduction of our metal organic products. We are there for our customers from conceptualization through start-up and beyond.

Our metal organics handling manual was developed by a team of seasoned technical operators and product specialists. The manual provides details on the properties and reactivity of metal organics, appropriate personal protective equipment (PPE), first aid, fire control, container design, loading and unloading procedures, and a host of other useful information. Albemarle is ready to provide our customers with 24-hour, around-the-clock support through our Emergency Response program.

Our Emergency Response Coordinator is on standby in the event of an accident to supply basic information about the product, contact the appropriate persons within Albemarle to provide detailed information and/or assistance, and advise the appropriate external groups about the emergency/incident, if necessary.



**Delivery you  
*can depend on.***



Albemarle is a specialty chemicals company that leads the world in transforming essential resources into critical ingredients for mobility, energy, connectivity and health. With over 50 years of science-driven expertise, we are a trusted global provider of advanced curatives and organometallics solutions that empower our customers worldwide.

As one of the world's largest suppliers of bromine and lithium products, Albemarle is vertically integrated — from resource extraction to tailored product development. This integration provides supply chain transparency and reinforces our mission to make a meaningful impact on people and the planet.

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