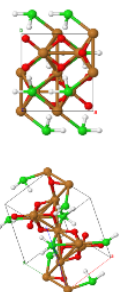
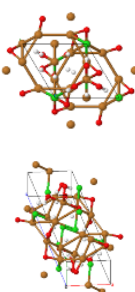
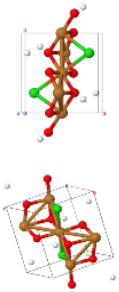
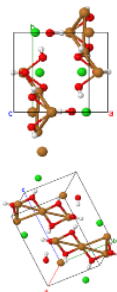


Vistore™ Copper

Phibro has used Basic Copper Chloride since it was introduced by Micronutrients. Our quality program monitors the efficacy and safety of our ingredients through detailed, routine analyses. These analyses go beyond the major element (Cu) and the contaminants (Pb, Cd, As, Hg, dioxins and furans) to include a 162 point elemental fingerprint and scans of the crystalline structure to confirm product consistency. The analytical history we have accumulated through our DQA® program provides us an understanding of potential quality issues and a basis for ensuring the quality of the Phibro **Vistore Copper**.

Vistore Copper - A Single Chemical Formula

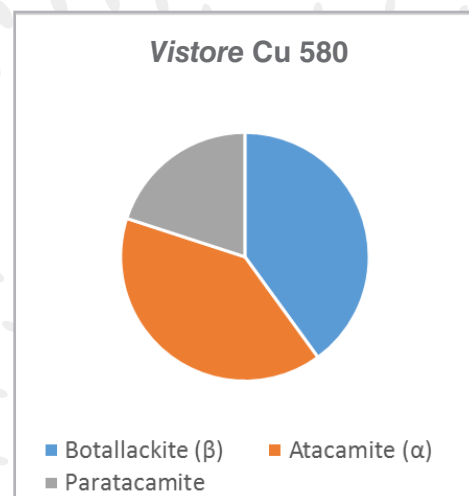
$Cu_2(OH)_3Cl$				
Many Names: <ul style="list-style-type: none"> • Basic Copper Chloride (AAFCO name) • Vistore Cu 580 (Phibro trade name) • Tribasic copper chloride • Intellibond® C (Micronutrients trade name) • Copper chloride hydroxide • Copper hydroxide chloride • Copper hydroxychloride • Dicopper chloride trihydroxide • Copper trihydroxyl chloride 	Multiple Crystalline Structures:			
	Atacamite 0% - 100%	Paratacamite 0% - 28%	Botallackite 0% - 100%	Clinoatacamite 0% - 30%
				

Downs, R.T. and Hall-Wallace, M. (2003) The American Mineralogist Crystal Structure Database.

A variety of names, are used for Basic Copper Chloride based on different nomenclatures. All of those listed above are correct and describe the same compound.

Although there is only one empirical formula for Basic Copper Chloride, it can crystallize in different configurations to form four different crystalline structures. Crystalline structure is dependent on the reaction conditions at the time the crystals are formed.

Phibro's choice is to provide a product that contains a mixture of the three primary crystalline structures, thereby avoiding a shift from 100% "α" form (Atacamite) to 100% "β" form (Botallackite).





Phibro's Chosen Path – Providing Efficacy, Food Safety and Value

We have done our homework and selected a partner that will meet the most stringent quality programs. We understand the risks associated with the raw materials and the manufacturing process and have programs in place to ensure a quality product.

Phibro evaluated products from several Basic Copper Chloride manufacturers to closely evaluate their manufacturing process and quality programs. All but one of these fell short of our standards.

Phibro selected a manufacturer that:

- Produces a high quality product that is safe, consistent and efficacious
- Has programs in place to meet FSMA regulation
- Holds 3rd party certification for feed ingredients
- Has a high level of engineering and manufacturing expertise

A secure supply is important. Phibro has exclusive distribution of this product for the U.S. and many other countries.

Phibro's Commitment

We support the animal feed industry with heavy investments into research, both on the animal front and on the material science front.

Our **Material Science Group** works to understand the most basic chemical building blocks.

Our **Animal Research Group** conducts in vivo studies to determine the biological availability and efficacy of ingredients.

Our Goal: To tie biological activity to chemistry giving us the tools to properly monitor ingredient quality and consistency.

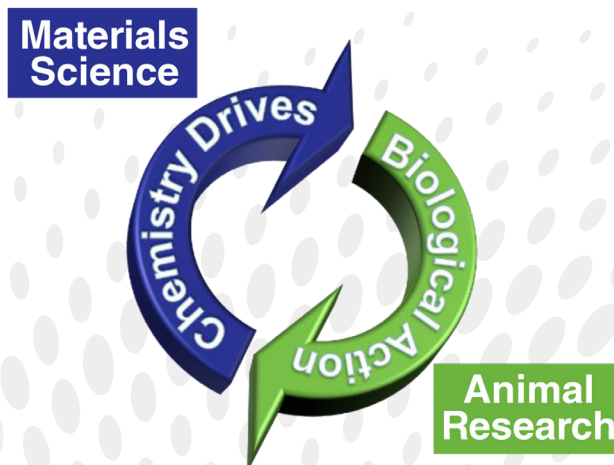
In 2017 we conducted studies on Organic Trace Minerals, Basic Chlorides, Sulfates and Se Yeast.

A quail study comparing copper sulfate, Phibro's **Vistore Cu 580** and competitor's Basic Copper Chloride showed no significant statistical difference between the treatments in Feed Intake or Liver Copper. There was a significant statistical increase in Bird Weight at 24 days between copper sulfate and the two basic copper chlorides. There was no significant statistical difference in Bird Weight between the basic copper chlorides. A copy of the study report is available upon request.

Conclusions:

Phibro's **Vistore Cu 580**:

- Contains the same level of copper (58% Cu) as Intellibond® C
- Shares the same chemistry and crystalline structure as Intellibond® C
- Has shown equivalent biological activity



This information has been prepared for industry technical professionals.