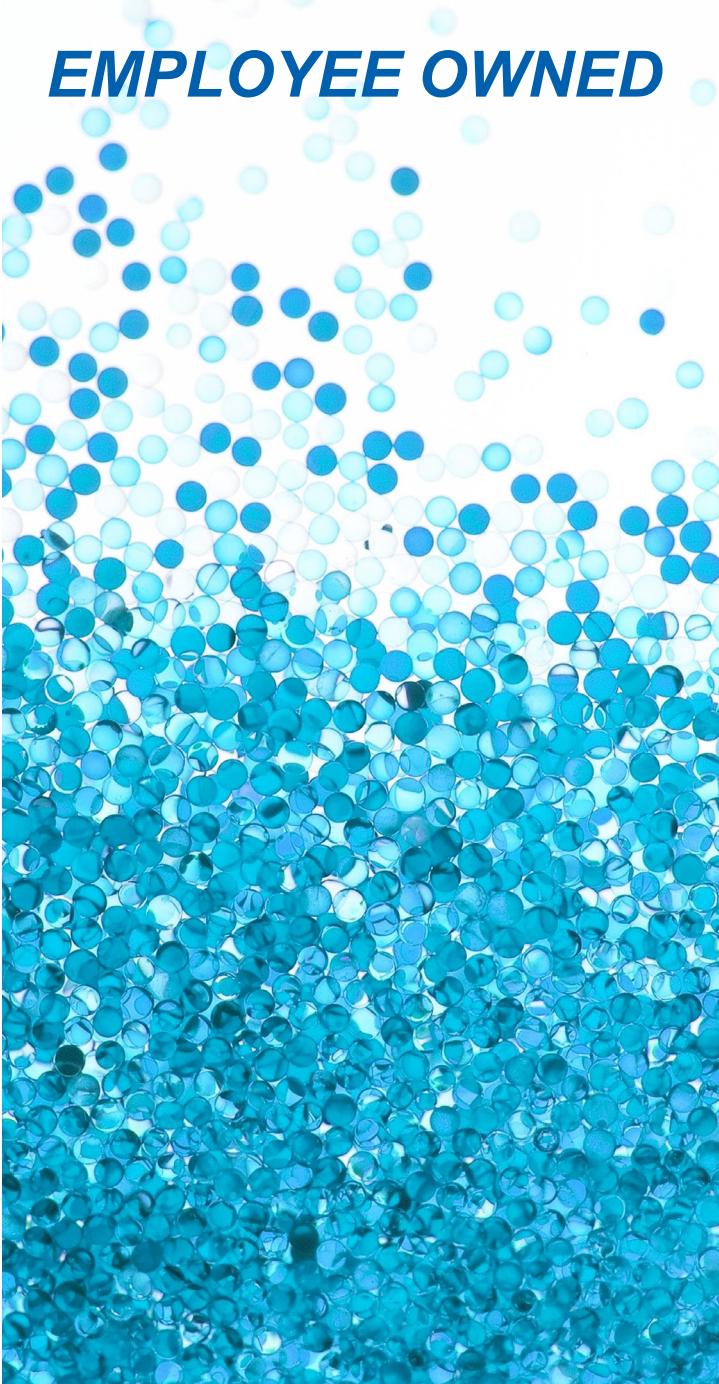


EMPLOYEE OWNED



ENCAPSULATION TECHNOLOGIES

AVEKA has microencapsulation techniques that are applied to a wide range of materials serving a variety of industries such as food, personal care, and agriculture. Our broad scientific and engineering expertise gives us the ability to investigate and tailor the microencapsulation approach to best meet your needs.

Our encapsulation technologies include processes such as spray drying, prilling, and alginate encapsulation. We offer a number of bead formation techniques and visual appeal. Each technique offers unique and specific advantages dependent on factors such as:

- BEAD SIZE
- RELEASE MECHANISM
- ENCAPSULATION MATERIAL

AVEKA brings years of microencapsulation experience, with proven technology and an extensive intellectual property position to assist in developing and producing your unique engineered particle.

AVEKA is your microencapsulation solution provider from R&D to production.

HIGHLIGHTS

- SPRAY DRYING
- PRILLING
- DRY WATER
- ALGINATE ENCAPSULATION

MICROENCAPSULATION

	Spray Drying	Prilling	Alginate soft Beads
Core Materials: Liquids			
Water miscible	some		
Hydrophobic (oils, etc)	■	■	■
Core Materials: Solids			
Water soluble		■	
Water insoluble	■	■	■
Wall Material			
Typical material	sugars, starch	wax	salt of alginic acid
Release Mechanism			
Pressure (breakage)	■	■	■
Dissolving	■	■	■
Heat (melting)		■	slight
Chewing	■	■	■
Digestion	slight	■	■
Approved for:			
Food	■	■	■
Cosmetics	■	■	■
Capsules			
Type	core-shell	matrix	matrix
Typical payload, %	0-50	0-60	0-30
Size limits, microns	5-30	20-2000	200-5000
Process			
Relative cost	low	medium	medium

ADVANTAGES	Low cost, able to make water soluble walls	Can set release temperature by matrix material selection	Approved for foods, beverages, wet or dry delivery
DISADVANTAGES	Limited to water soluble wall materials	Matrix-type capsule presents less resistance to fill release	Capsules somewhat fragile. Some fills may leak slowly
IDEAL SYSTEM	Vitamin E oil in a water soluble shell	Flavor, color and nutraceuticals, solids	Emollients and fragrances for personal care products. Flavors, color of food