

## TICAmulsion® A-2010: Advanced Technology for High Oil Load Emulsions



Many of the top marketplace trends seen in the food industry as a whole are driving product development efforts and market share expansion in the beverage industry. Beverage fortification with vitamins, minerals, and fibers amid other general health and wellness claims have generated market segment growth estimates of 8-10% CAGR for 2012 through 2017.

TIC Gums has developed a patented enabling technology, TICAmulsion® A-2010, that helps meet these formulation and development efforts for beverage manufacturers.

Traditionally beverage emulsion technology has been limited by the range of commercially available emulsifiers and stabilizers. Historical constraints have centered on oil loading capacity, increased viscosity profiles, and overall emulsion stability. TICAmulsion® A-2010 offers a significant benefit by providing high oil loading capacity and higher Brix emulsion concentrates with minimal viscosity build, producing emulsions with excellent stability.

### Introduction

TICAmulsion® A-2010 is an Octenyl Succinic Anhydride (OSA) modified *Acacia seyal* (Gum Arabic, grade 2). Therefore, TICAmulsion® A-2010 does not face the challenges sometimes associated with *Acacia senegal* (Gum Arabic, grade 1) such as unreliable supply and pricing due to limited growing areas.

TICAmulsion® A-2010 can be used to:

- Achieve stability in high oil load emulsions without building excess viscosity
- Expand product development opportunities through increased efficiencies
- Satisfy “Non-GMO” classification in accordance with the European Commission labeling requirements
- Provide cost-in-use savings throughout production, packaging, and shipping

### Particle Size Analysis

Particle size is a measure of emulsion stability as it detects initial homogenization effectiveness and is an indicator of long term stability. A stable beverage emulsion is characterized by having an initial

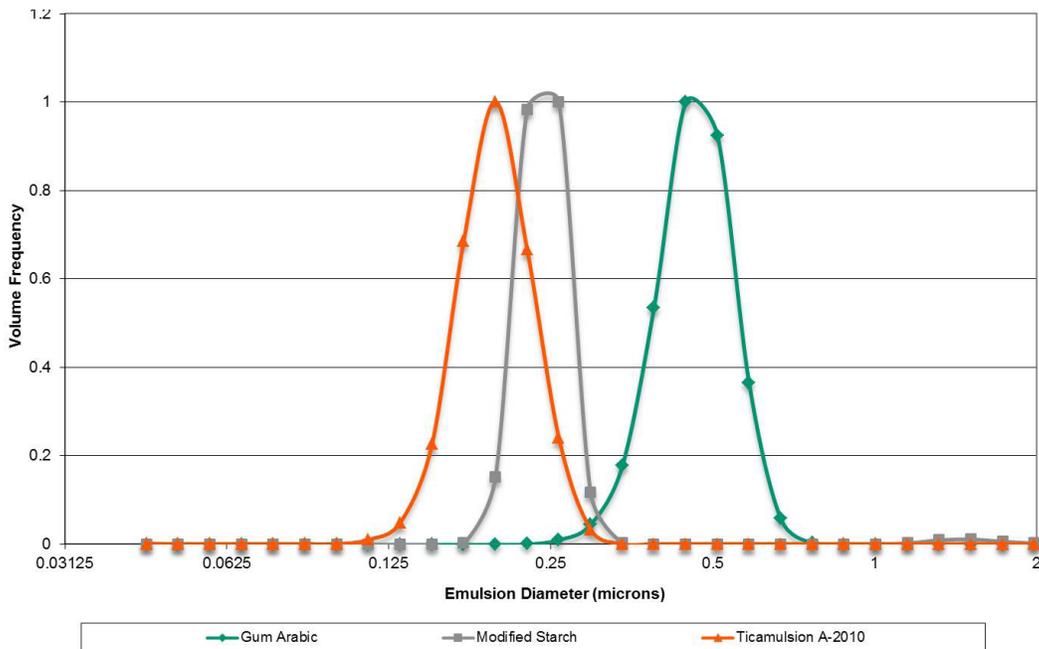
low mean particle size that remains relatively the same over the duration of shelf life.

To test the effectiveness of TICAmulsion® A-2010, in comparison to modified food starch and gum arabic, 20% oil emulsions were created and analyzed for mean particle size in a finished beverage formulation. Results were measured using the Beckman Coulter LS 13 320 Particle Size Analyzer (laser diffraction).



## Particle Size Analysis Continued

Graph 1. Day One Particle Size Comparison



As seen in Graph 1, TICAmulsion® A-2010 has the smallest initial mean particle size compared to modified food starch and gum arabic. This is an initial predictive indicator of a more stable emulsion.

The emulsions were tested again on day 26 to measure particle size changes. As shown in Table 1, TICAmulsion® A-2010 had the smallest change in particle size, indicating that the emulsion made with TICAmulsion® A-2010 continues to have the highest level of stability.

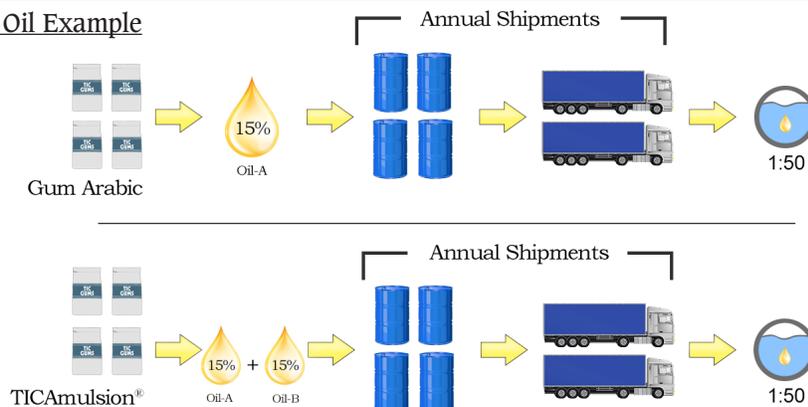
Table 1. Mean Particle Size Change on Day 26

	Day 1 Particle Size $\mu\text{m}$	Day 26 Particle Size $\mu\text{m}$
TICAmulsion® A-2010	0.20	0.21
Modified Food Starch	0.23	0.26
Gum Arabic	0.44	0.51

When formulating with TICAmulsion® A-2010, the finer particle size increases the refractive index and may contribute to an initial increase in turbidity in the emulsion concentrate. However, with TICAmulsion® A-2010, the ratio of emulsifier to oil is lower, contributing less turbidity in the finished beverage. If more turbidity is needed for cloud emulsions, TIC Gums' team of Gum Gurus® offers customized solutions.

## Innovation in Product Development

Figure 1. Nutritional Oil Example



The high oil load capacity of TICAmulsion® A-2010 expands product development opportunities by enabling increased efficiencies and opportunities within beverage fortification. In the example shown in Figure 1, an emulsion concentrate manufacturer is able to either double the initial concentration of a nutritional oil, or add multiple nutritional oils to the same emulsion concentrate. There would be no change to the original dilution process or ratios.

### Regulatory Approval

The regulatory approval of TICAmulsion® in major markets around the world allows product developers to take advantage of the many benefits of TICAmulsion® A-2010 while introducing product innovations internationally.

In the most recent approval in 2013, Annexes II and III to Regulation (EC) No 1333/2008 of the European Parliament and of the Council and the Annex to Commission Regulation (EU) No 231/2012 were amended to include OSA modified gum arabic (E 423) as an authorized food additive. Other markets include North America and Mexico. For a full list, please contact TIC Gums at +1 410-273-7300.

TICAmulsion® is also classified as Non-GMO, defined by TIC Gums as “A finished product derived from ingredients that are believed to contain no more than 0.9% material derived from genetically modified organisms.” For more information, visit [www.ticgums.com/non-gmo-letter](http://www.ticgums.com/non-gmo-letter).

## QUESTIONS?

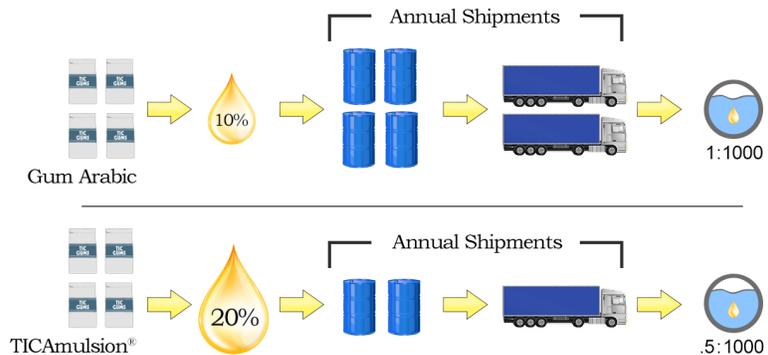
### Contact the Gum Gurus®

The Gum Gurus® will work with you to interpret this information and recommend the best texture and stability solutions. To speak with a Gum Guru®, call +1(410) 273-7300 or chat online at [www.ticgums.com/chat](http://www.ticgums.com/chat).

### Increased Production Efficiencies

TICAmulsion® A-2010 provides a cost-in-use savings due to its higher oil load capacity, compared to standard emulsifiers such as gum arabic. In the example found in Figure 2, a standard orange beverage emulsion created with TICAmulsion® A-2010 at a 20% oil load, has a lower cost-in-use per pound of oil than one containing gum arabic at a 10% oil load.

Figure 2. Production Efficiencies Example



Additionally, the increased oil load enables reduced packaging, warehouse and freight costs per pound of oil. Production efficiencies can be realized during manufacturing and at the finished beverage bottling operation.



### TICAmulsion® Capacity Summary

Companies now have access to TICAmulsion® A-2010 with recent regulatory approval in markets across the globe. TICAmulsion® A-2010 is a superior emulsifier for high oil load emulsions compared to gum arabic and modified food starch. TICAmulsion® A-2010 creates a smaller particle size that resists agglomeration during the shelf life of the concentrate. This contributes to better long-term emulsion stability.

This patented product also enables product developers to create higher oil load concentrates while maintaining typical viscosity profiles. TICAmulsion® A-2010 allows for increased production efficiencies, new product development opportunities and potential cost-in-use savings.

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The information provided is based upon tests and observations made under laboratory conditions and is believed to be accurate. Test results may, however, vary depending upon testing conditions. In furnishing samples and product data and specifications, TIC Gums, Inc. makes no warranty, either express or implied, including any warranty of merchantability or fitness for a particular purpose. It is expressly understood and agreed that it is the Buyer's responsibility to determine suitability of the product for a particular purpose, product or process. To obtain a description of our testing methodologies, please contact TIC Gums, Inc. at (800) 899-3953 or (410) 273-7300.

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