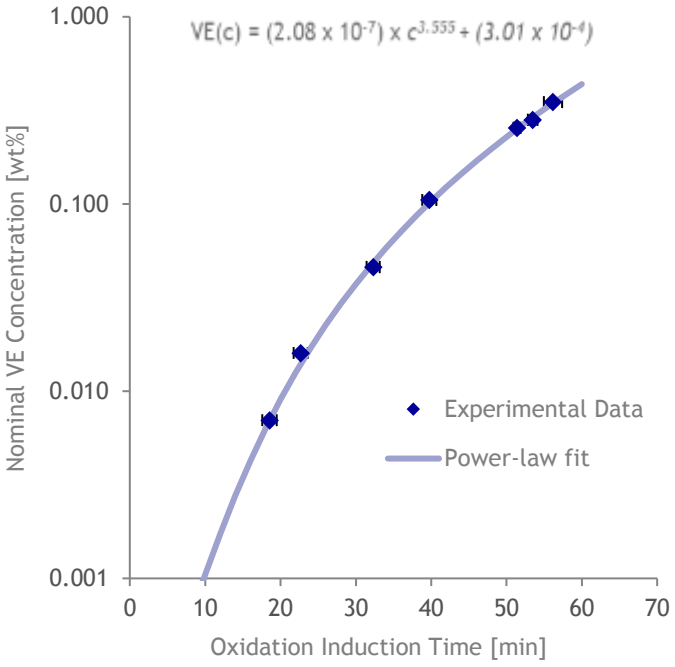
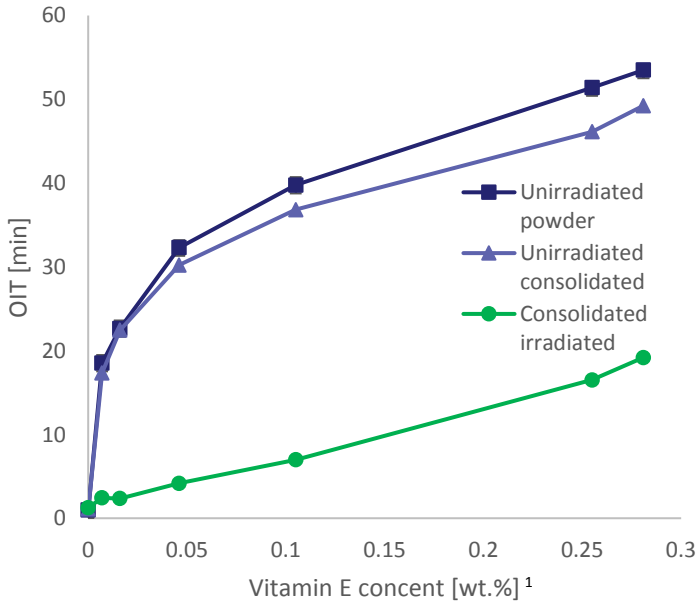
Cambridge Polymer Group

Oxidative Induction Time Measures Active Antioxidants

Medical Device: Orthopedics





Summary

The third-generation ultra-high molecular weight polyethylene (UHMWPE) materials currently being used in orthopedics rely on antioxidants to stabilize their properties over time. Until now, no reliable method for measuring trace amounts of these antioxidants has been available. Cambridge Polymer Group is the first group to utilize thermal stability as an indicator for effective antioxidant concentration, even after processing. Although originally developed to examine the concentration of Vitamin E, this technique will find value in determining the effective concentration of any antioxidant present in the material.

Description

One of the challenges in manufacturing oxidatively stabilized polyethylene is determining the amount of active antioxidant in the formulation. After compounding and processing, this may be significantly lower than desired, and it is therefore vital for quality control purposes to determine these levels before implantation. In addition, the potentially low concentrations involved mean that conventional techniques are inadequate. CPG realized that a standard ASTM technique (D3895) could be leveraged to provide a simple power-law relationship between Vitamin E concentration and Oxidative Induction Time (OIT) using a standard DSC. The small sample size, rapid turnaround and ease of sample preparation make this technique ideal for quality control purposes.

Uses

Quality control	Qualitative ranking of stabilized materials
R&D screening	Thermal history analysis

1. Heuer EG, Braithwaite GJ, Miller BL, et al. Oxidative-induction time as a measure of vitamin E concentration in ultra-high molecular weight polyethylene. *J Biomed Mater Res B Appl Biomater*. 2015;103(1):106-115. doi:10.1002/jbm.b.33175

Cambridge Polymer Group, Inc. is a contract research laboratory specializing in materials. We partner with our clients to solve the world's toughest polymer problems utilizing our multi-disciplinary research team and full service laboratory.

We work with clients throughout the product life cycle to:

- Develop new materials
- Design prototypes for proof-of-concept studies
- Create and execute experimental design
- Validate and verify manufacturing processes
- Perform root-cause analysis in product failures

Cambridge Polymer Group, Inc. was founded in 1996 to provide a cost-effective resource for testing, research and development to clients who need periodic access to Ph.D.-level scientists and their support structure. We have developed a host of testing methods and materials for our clients, which number more than 1,000.

100 TradeCenter Drive, Suite 200, Woburn, Massachusetts 01801
P: 617-629-4400 • F: 617-629-9100 • info@campoly.com • www.campoly.com
ISO 17025 Accredited #3930.01 & **ISO 9001 Certified** #000912-1-US-1-QMS
DEA Licensed #RC0548606 & **FDA Registered** #3005793482

Cambridge Polymer Group