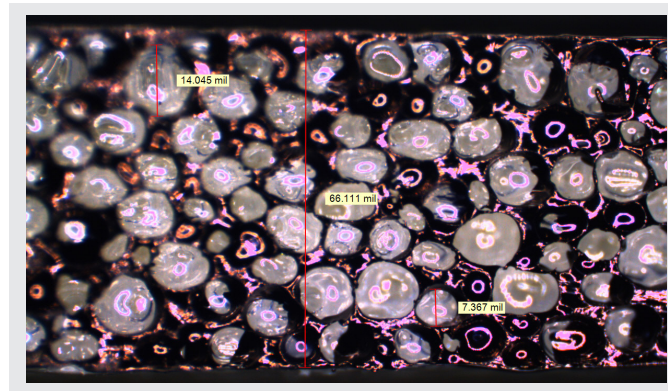
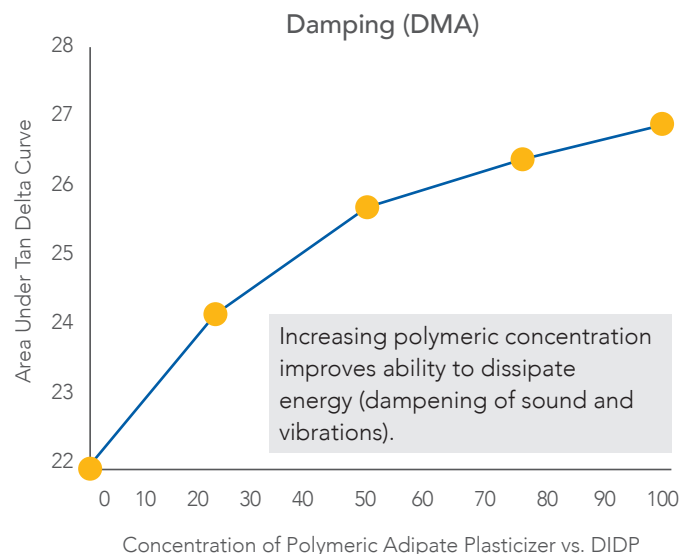


POLYMERIC PLASTICIZER PERFORMANCE IN PVC FOAM

PVC foam manufacturers have historically used low molecular weight monomeric esters to plasticize their products. With higher performance expectations and new regulations, we believe there is an unmet need. Hallstar has evaluated polyester adipate plasticizers in PVC foam to provide formulators new tools compared with monomeric esters (DIDP).

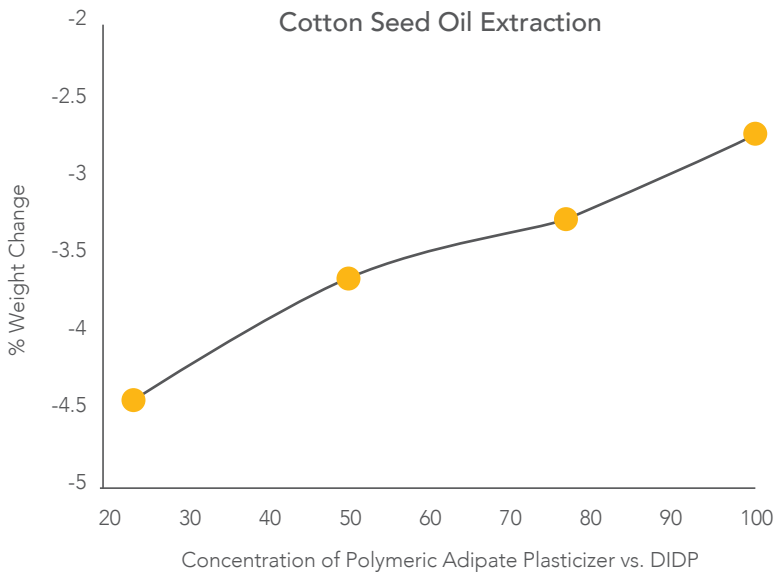
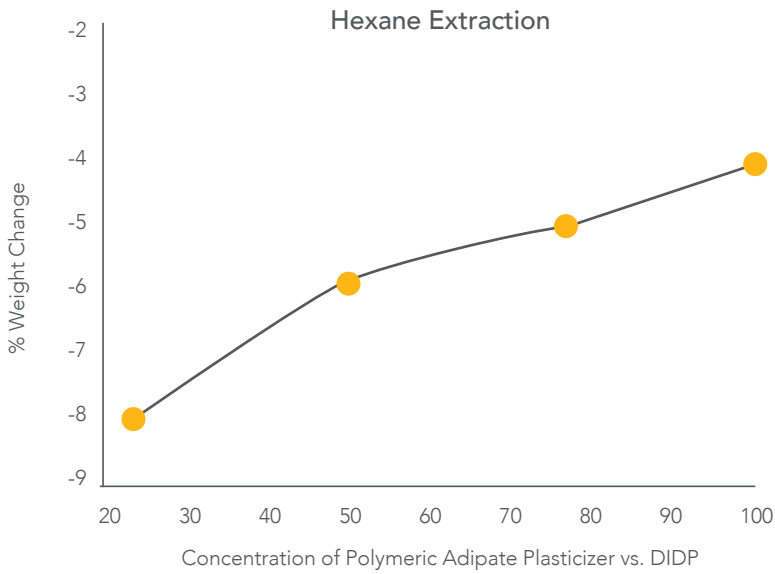
We compared plasticizers in a ladder study starting with 85phr polymeric plasticizer followed by 4 additional combinations that ended with 85phr DIDP.

Ingredients	AD-1	AD-2	AD-3	AD-4	AD-5
Inovyn 367NK (PVC Resin)	100	100	100	100	100
DIDP (Monomeric Plasticizer)	0	20	42.5	65	85
Polymeric Adipate Plasticizer	85	65	42.5	20	0
Blowing Agent Mixture	5	5	5	5	5



SEM Microscopy of PVC foam cross-section using polymeric adipate formulation (AD-1): uniform distribution of cells found, similar to monomeric plasticizers.

In a PVC foam formulation, we found that our polymeric adipate plasticizer matched the cell structure found in a DINP plasticized formulation, but our polymeric adipate outperformed DINP by increasing damping, elongation and hexane extraction.



Hexane extracts the DIDP causing significant shrinkage and loss of flexibility.

By replacing a small fraction of monomeric plasticizer with Hallstar's polyester plasticizers, foam manufacturers can dramatically improve the extraction resistance, durability, and safety of high performance foam articles.