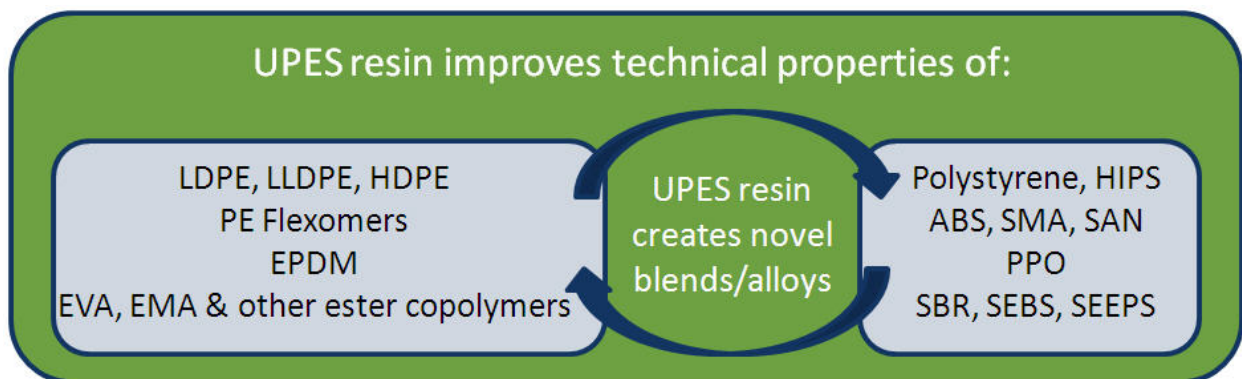


Achieve a balance of performance and cost. UPES resin is an additive that enables significant source reduction while increasing performance and maintaining cost. Its bi-functional versatility offers enhanced compatibility with various polymer systems and broadens the processing window of most polyolefins.

A Sustainable Solution, UPES resin enables improved processability, material source reduction and energy savings – helping to limit the environmental impact of polymer based products.

Customers specifying UPES resin have experienced the following product enhancements:

Processability	Increased temperature range	Melt strength	Printability
Stiffness	Predictable performance outcomes	Density potential	Reduced QC issues
Added flexibility	Material source reduction	Improved adhesion	



Commercial Project: Imagination Playground



UPES resin enabled the development of advanced foam material to create safe and sustainable play parts for urban playgrounds. The foam parts created using UPES resin are components of the Imagination Playground Initiative developed by KaBoom! and Rockwell Group. Playgrounds built as part of this initiative offer children a rich environment of diverse materials encouraging unstructured, child-directed “free play.”

To learn more please visit www.imaginationplayground.org.

UPES Resin Product Property Overview

Properties ⁽¹⁾	ASTM ⁽²⁾	UPES-090-EXP	UPES-170-EXP	UPES-315
Tensile Strain at Break (%)	D 638	54.2	5.7	2.7
Flexural Modulus (psi)	D 790	89 200	169 900	300 000
Notched Izod (ft-lb/in) ^{a,b,c}	D 256	11.3	2.8	0.4
Un-notched Izod (ft-lb/in)	D 256	12.2	20.2	12.5
Melt Flow Index ⁽³⁾ (g/10 min)	D 1238	0.32	0.23	0.24

- (1) Properties were determined on injection-molding specimens following the protocols of ASTM D4549 "Standard Specification for Polystyrene Molding and Extrusion Materials" unless otherwise specified.
- (2) The product properties designated in this standard have been determined in accordance with the current issues of the specified testing methods. Methods of the American Society for Testing and Materials (ASTM) are used wherever applicable.
- (3) Melt flow index at 230°C/2.16kg (446°F/4.76lb).
- a) UPES-090-EXP : Notched Izod specimen displayed partial break, un-notched specimen displayed torque and flex upon impact, but no break
- b) UPES-170-EXP: Notched Izod specimen displayed hinged break, un-notched specimen displayed indentation, but no break
- c) UPES-315: Notched Izod specimen displayed break, un-notched specimen displayed break

*UPES resin as an additive to polyolefins in thermoforming applications enables significant **source reduction** while **increasing performance** at **no additional cost.***

The information contained herein is provided for general reference purposes only. By providing the information contained herein, NOVA Chemicals Inc. makes no guaranty or warranty and does not assume any liability, with respect to the accuracy or completeness of such information, or product results in any specific instance, and hereby expressly disclaims any implied warranties of merchantability or fitness for a particular purpose or any other warranties or representations whatsoever, expressed or implied. Nothing contained herein shall be construed as a license to use the products of NOVA Chemicals Inc. in any manner that would infringe any patent. Nothing herein shall be copied, reproduced, distributed or otherwise used without the express written permission of NOVA Chemicals.

© 2009 NOVA Chemicals Inc.

 is a trademark of NOVA Chemicals Inc.; UPES and QINNEX are trademarks of NOVA Chemicals Inc.