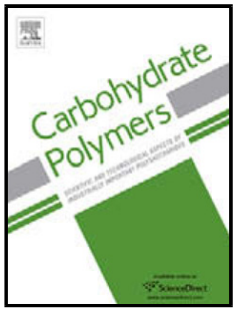


Title: Effect of Different Polyol-Based Plasticizers on Thermal Properties of Polyvinyl Alcohol (PVA):Starch Blends Films

Author: Ahmet Alper Aydın Vladimir Ilberg

PII: S0144-8617(15)00841-3
DOI: http://dx.doi.org/doi:10.1016/j.carbpol.2015.08.093
Reference: CARP 10296

To appear in:

Received date: 20-5-2015
Revised date: 12-8-2015
Accepted date: 29-8-2015

Please cite this article as: Aydin, A. A., and Ilberg, V.,Effect of Different Polyol-Based Plasticizers on Thermal Properties of Polyvinyl Alcohol (PVA):Starch Blends Films, Carbohydrate Polymers (2015), http://dx.doi.org/10.1016/j.carbpol.2015.08.093

# Effect of Different Polyol-Based Plasticizers on Thermal Properties of Polyvinyl Alcohol (PVA):Starch Blends Films

Ahmet Alper Aydın[1,*] and Vladimir Ilberg[2]

[1] Chemical Engineering Department, Faculty of Chemical and Metallurgical Engineering, Istanbul Technical University, 34469 Maslak, Istanbul, Turkey. **Email:** aydinal@itu.edu.tr

[2] Faculty of Gardening and Food Technology, University of Applied Sciences Weihenstephan-Triesdorf, Am Staudengarten 11, D-85350, Freising, Germany.

## Abstract

A series of gelatinized polyvinyl alcohol (PVA):starch blends were prepared with various polyol-based plasticizers in 5 wt%, 15 wt% and 25 wt% ratios via solution casting method. The obtained films were analyzed by Fourier transform infrared (FT-IR) spectroscopy, differential scanning calorimetry (DSC) and thermogravimetric analysis (TGA). Remarkable changes have been observed in glass-transition temperature ($T_g$) and thermal stability of the samples containing varying concentrations of different plasticizers and they have been discussed in detail with respect to the conducted thermal and chemical analyses. The observed order of $T_g$ point depression of the samples with containing 15 wt% plasticizer content is 1,4-butanediol - 1,2,6-hexanetriol - pentaerythriyol - xylitol - mannitol, which is similar to the sequence of the thermal stability changes of the samples. In the presence of 25 wt % 1,4-butanediol, the $T_g$ point of PVA:starch films reduce from 76.1$^o$C to 37.2$^o$C.

**Keywords:** starch; polyvinyl alcohol; plasticizer; polyol; thermal properties; glass transition

**Chemical compounds studied in this article:** Corn Starch (PubChem CID: 24836924); Polyvinyl Alcohol (PubChem CID: 11119); 1,4-Butanediol (PubChem CID: 8064); 1,2,6-Hexanetriol (PubChem CID: 7823); Pentaerythritol (PubChem CID: 8285); Xylitol (PubChem CID: 6912); Mannitol (PubChem CID: 6251)