SECTION II – CHEMISTRY
Poster Session
Thursday Morning
Arthur J. Bond Engineering Building, Auditorium
Authors Set-up: Begins at 10:30 am
Authors Present: 11:00 am – noon; Viewing and Judging
Christopher Stopera, Presiding

1. **u A THERMOGRAVIMETRIC ANALYSIS OF TETRACHLOROETHYLENE-METHYL METHACRYLATE COPOLYMERS. *Peter Cote*, Loren Cheatwood, Donna Perygin, Jacksonville State University.

   A tetrachloroethylene/methyl methacrylate copolymer matrix was synthesized at incremental methyl methacrylate proportions. A mass-loss event was observed when differential scanning calorimetry was performed on the resulting solid polymers. A sigmoidal curve was generated by thermogravimetric analysis. From this curve, we calculated the rate of mass-loss. The rate of mass-loss was observed to be inversely proportional to the concentration of methyl methacrylate but was still observed at 100%. We performed an evolved gas analysis to determine the composition of the volatile product.

2. **u SYNTHESIS AND CHARACTERIZATION OF LI DOPED KDP. *Niya Mayo*, Kourtney Steen, Kamala Bhat, Aschalew Kassu, Alabama A&M University.

   Potassium dihydrogen phosphate (KDP) has numerous applications in opto-electronics, as a ferroelectric material in addition to being a second harmonic generator. KDP crystals can be easily grown in a laboratory. KDP is synthesized by the reaction of potassium carbonate and phosphoric acid in mole ratio. After the reaction was completed, the solution was diluted with water and heated to avoid saturation in order to grow single large crystals at a slow rate. At the same time, another set of experiments was set up to grow 5%, 10%, 15%, and 20% lithium doped KDP crystals. Initial preparation of the 5% lithium doped KDP showed that very small crystals formed quickly, rather than the 10%-20% crystals, which took much longer to form. This solution was redissolved to obtain a clear solution and allowed to crystallize slowly. The objective of this research is to compare the effect of Li dopant on the property of the KDP crystal. Characterization for each of the crystals will be presented after determining the melting point of the crystal, followed by the functional group characterization using Fourier Transform Infrared Spectroscopy, elemental analysis for metals and phosphorus using inductively coupled plasma optical emission spectroscopy (ICP-O-ES), and optical characterization by UV-Vis spectroscopy to determine the changes in the band gap.

3. **u THERMAL DEGRADATION OF POLYETHYLENE AND POLYPROPYLENE UNDER PLASTIC RECYCLING CONDITION – A STUDY OF VOLATILE COMPOUND PROFILE. *Du Luu*, Logan Ledbetter, and Shaoyang Liu, Troy University.

   Although recycled plastics provide a low-cost and environmentally friendly alternative for a wide range of applications, there are several factors that significantly limit desirability for use of these plastics. Most notably among these is thermal degradation of polymers during the recycling process of these plastics, which may compromise mechanical performance and cause an unpleasant odor. In this work, a headspace solid-phase microextraction (HS-SPME) coupled with a gas chromatography-mass spectrometry (GC-MS) method was employed to help understand thermal degradations of low-density polyethylene (LDPE), high-density

polyethylene (HDPE), and polypropylene (PP) under a typical processing temperature (200°C) for plastic recycling. Volatile compounds from the three plastics before and after heating were monitored. The results show that each plastic has a unique volatile compound profile. They had notable differences in thermal stability and released different degradation products. LDPE had the lowest thermal stability among the three materials studied in this work and gave out an abundance of volatile compounds after twenty minutes of heating. Accelerated degradation of PP was detected after heating for thirty minutes, while HDPE was still relatively stable after heating for forty minutes. The volatile compound analysis carried out in this work could be used as an effective way to identify the type of plastics and evaluate their extent of thermal degradation. The results of this research may aid the plastic recycling industry in improving product quality.

4. **u SYNTHESIS OF TRIARYLSULFONIUM IONIC LIQUIDS. *Jeanette Pina*, Amanda Coffman, University of North Alabama.

   Improved purification methods for the synthesis of triarylsulfonium ionic liquids is presented here. Triarylsulfonium ionic liquids are thermally robust ionic liquids (ILs) that have melting points ranging from 63-105 ºC at ambient pressure. These thermally robust ILs have displayed little mass loss nor changes in structure when heated to temperatures of 300 ºC for a period of 90 days. [1]Ionic liquids with such increased stability at elevated temperatures could become ideal solvents for synthetic reactions that only proceed at reasonable rates and/or provide substantial product yields at relatively higher temperatures. Additionally, the ionic nature of these salts containing large aromatic organic substituents should promote aqueous and organic miscibility, functioning as phase-transfer catalysts (PTCs) in nucleophilic reactions. [1. Siu, B.; Cassity, C. G.; Benchea, A.; Hamby, T.; Hendrich, J.; Strickland, K. J.; Wierzbicki, A.; Sykora, R. E.; Salter, E. A.; O'Brien, R. A.; West, K. N.; Davis, J. H. RSC Advs, 2017, 7, 13, 7623-7630.]

**u* or **g* Denotes presentation entered in student competition as an undergraduate or graduate student, respectively.