# Online Proceedings

## POSTER SESSION 4

**Balcony, Easel 92**

*4:00 PM to 6:00 PM*

**Synthesis of Ferrate: Comparison of Feasibility of Electrochemical and Chemical Methods**

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The purpose of this experiment was to investigate the feasibility of the electrochemical synthesis of ferrate and bleach using a boron-doped diamond electrochemical cell. As ferrate's only byproduct in oxidation reactions is Fe(III), ferrate is a powerful alternative in the disinfection of waste water treatment to eliminate pathogenic bacteria such as E. coli. from water streams, where more traditional disinfectants give halogenated byproducts. However, ferrate degrades rapidly outside of basic solution and current synthetic methods are prohibitively expensive and require hazardous reagents. The two competing syntheses are direct electrochemical production and wet oxidation by concentrated bleach. In the first, difficulties present relating to stability of the electrode; continual oxidation wears the electrode, increasing management and production costs. In the chemical synthesis high concentrations of bleach are required, equilibrium lies to the left, and yield is low. This project attempted to remedy the first by using diamond, a highly chemically resistive carbon allotrope, as the electrode, and to see to what extent electrochemical processes are still hindered. To remedy the difficulty of chemical synthesis the electrochemical cell was also used to oxidize bleach and investigate yields therein. In each case electrochemical synthesis of bleach and ferrate was compared to other methods.

## POSTER SESSION 4

**Balcony, Easel 91**

*4:00 PM to 6:00 PM*

**Monitoring Chemicals Produced in the Vapor of Electronic Cigarettes**

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Electronic cigarettes use a heating coil to aerosolize a liquid made of ingredients which are only approved safe by oral consumption. However, there remains a question as to whether these components may react or decompose to form other, potentially harmful or toxic, substances when exposed to the high temperatures of the vaporizer. Gas chromatography and mass spectrometry (GC/MS) were used to identify chemicals in generic e-liquid and in the vapor produced from the e-cigarettes. A replica of an electronic cigarette was constructed in order to have better control over the temperature coil and produce vapor in a range of 200-700 ???C. Seven of the common and commercially available e-liquids were investigated in this study. The chemicals were quantified in a low parts per million (ppm).The nature and the toxicity of the identified chemicals were then discussed based on the available literature information.