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| Title or description of Procedure, Equipment or Process | Department | Completed By | Date  |
| **Determination of Acid Detergent Fiber (ADF) – ANKOM Fiber Analyzer** | **Proximate Analysis**Dept. AFNS, University of Alberta, Ag/For Centre, Edmonton | **Kelvin Lien** | **Nov 14, 2013** |

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| **Chemical** | **WHMIS Class** | **Chemical Hazard (HMIS) Ratings** | **Hazard Control** |
| Health0 - 4 | Flammability0 - 4 | Reactivity0 - 4 | Potential Dose\* |
| Cetyltrimethylammonium bromide (CTAB) | D-2B Toxic | 2Irritant | 1 | 0 | Med | - Work in a fume hood to control airborne concentrations.- Ensure access to eyewash and safety showers.- Ensure familiarity with MSDS and emergency procedures.- Gloves, splash goggles, and dust mask. |
| Sulfuric Acid | D-1A Very ToxicE Corrosive | 3 | 0 | 2 | Med | - Work in fume hoods when possible to control vapors.- Ensure availability of eyewash station and safety shower.- Ensure familiarity with MSDS and emergency procedures.- PPE – gloves, splash goggles and acid resistant apron. |
| Acetone | B-2 FlammableD-2B Toxic | 2 | 3 | 0 | High | - Work in fume hoods when possible to control vapors.- Ensure availability of eyewash station and safety shower.- Ensure familiarity with MSDS and emergency procedures.- PPE – gloves, eye protection |

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| **Task or Task Sequential Step** | **Environmental Factor, Equipment, Material, Harmful Substance, etc**  | **Potential Hazard** | **Hazard Control** |
| General | Glassware | - Cuts, lacerations | - Inspect all glassware for chips and cracks before use- Dispose of clean damaged glass in approved container. |
| 7.3.1.2 | Adding concentrated sulfuric acid to water | - Splashing (skin/eye contact)- Process is exothermic and burns can result | - ***Strong recommendation to purchase prepared solution from ANKOM*** (avoid using concentrated chemicals)- Add acid very slowly to water - large volume prohibits cooling of solution in an ice-bath so extreme care must be taken.- PPE – gloves, splash goggles, acid resistant apron |
| 7.3.1.3 | Working with cetyltri-methylammonium bromide (CTAB) | - See above for chemical health hazards- Large quantity increases risk of dust and exposure | - PPE same as above – gloves, splash goggles, acid resistant apron – plus a dust mask to prevent inhalation.- If possible work in a fume hood. |
| 7.3.1.4 | Stir with overhead stirrer | - Stirrer could drop or run out of control causing the carboy to break (large spill)- Stirrer could cause splashing- Electric – shock hazard | - Inspect stirrer and cords prior to use – do not use - report damage- Ensure that stirrer is properly secured and stable- Avoid contact with the stirring rod- Never leave stirrer unattended |
| 9.1 | Increased airborne dust from powdered samples  | - Potential for inhalation of dust, potential toxic effects from samples | - Hazard is dependent on nature and amount of sample – protection is sample specific and should be covered by separate hazard assessment.- For work with powdered samples, dust masks are recommended- Requirement for gloves based on the nature of the sample  |
| 9.1.5 | Heat sealer | - Shock and burns from exposed electric components- Burns from heated surfaces | - Inspect the instrument and cords for damage- Avoid working in areas with obvious moisture and fuel sources (ignition risk)- Instrument has exposed heated and electrical surfaces, care must be taken to avoid contact |
| 9.2.2 | Fiber analyzer vessel | - Shock – electrical equipment- Pinches – closing the lid- Burns – operation requires heating the vessel | - Inspect vessel and cords for damage – do not use - report damage- Training for proper closure and operation- Warning not to touch vessel while in operation |
| 9.3.1 | Opening hot vessel lid | - Burns – hot liquid (contents under pressure) and steam- Chemical burns, chemical exposure | - ***WARNING*** – do not open vessel lid – vessel must be drained through the exhaust prior to opening – see SOP. |
| 9.3.2/9.4.1 | Exhausting vessel contents  | - Burns from hot liquid and steam- Inhalation/contact exposure to hot chemicals | - Inspect exhaust hose for damage (replace if necessary)- Ensure that hose is securely securely attached to the vessel- Ensure hose and receiving vessel are secured. - Avoid inhalation of steam |
| 9.4.1 | Hot water | * - Burns, scalding
 | * - Wear insulated gloves when transferring to the vessel
 |
| 9.5.5 | Drying oven | - Burns (110º C) - Potential fire with acetone in oven  | - Acetone must be dried completely from the samples, in the fume hood, to order to avoid contact of acetone with heating elements- Heat resistant gloves for removing samples from the oven |

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| Name of Reviewing Supervisor | Signature of Reviewing Supervisor | Date |

HMIS: Health Hazard Rating Chart

\* Chronic Hazard - Chronic(long-term) health effects may result repeated overexposure.

0 = Minimal Hazard - No significant risk to health

1 = Slight Hazard - Irritation or minor reversible injury possible

2 = Moderate Hazard - Temporary or minor injury may occur.

3 = Serious Hazard - Major injury likely unless prompt action is taken and medical treatment is given.

4 = Severe Hazard - Life-threatening, major or permanent damage may result from single or repeated overexposures.

HMIS: Flammability Hazard Rating Chart

0 = Minimal Hazard - Materials that will not burn.

1 = Slight Hazard - Materials that must be preheated before ignition will occur. Includes liquids, solids and semi solids having a flash point above 200° F. (Class IIIB)

2 = Moderate Hazard - Materials which must be moderately heated or exposed to high ambient temperatures before ignition will occur. Includes liquids having a flash point at or above 100° F but below 200° F. (Classes II & IIIA)
3 = Serious Hazard - Materials capable of ignition under almost all normal temperature conditions. Includes flammable liquids with flash points below 73° F and boiling points above 100° F as well as liquids with flash points between 73° F and 100° F. (Classes IB & IC)
4 = Severe Hazard - Flammable gases, or very volatile flammable liquids with flash points below 73° F, and boiling points below 100° F. Materials may ignite spontaneously with air. (Class IA)

HMIS: Physical Hazard Rating Chart

0 = Minimal Hazard - Materials that are normally stable, under fire conditions and will not react to water, polymerize, decompose, condense or self react.

1 = Slight Hazard - Materials that are normally stable but can become unstable at high
temperature and pressures. Materials may react non-violently with water or undergo hazardous polymerization in the absence of inhibitors.

2 = Moderate Hazard - Materials that are unstable and may undergo violent chemical change at normal temperature and pressure with low risk for explosion. Materials may react violently with water or form peroxides upon exposure to air.

3 = Serious Hazard - Materials that may form explosive mixtures with water are capable of
detonation or explosive reaction in the presence of a strong initiating source or undergo chemical change at normal temperature and pressure with moderate risk of explosion.

4 = Severe Hazard - Materials that are readily, capable of water reaction, detonation or explosive decomposition at normal temperatures and pressures.

Potential Dose Rating

Exposure (Dose) based on the amount of chemical one is working with (based on U of A EHS Spill Response Guidelines):

* *High = High Exposure* – For Stock Chemicals/Solutions: Flammable liquids more than 500ml; all other Chemicals more than 1 litre liquid or 500 grams solid (Spill is considered by U of A EHS to be an Emergency).
* *Med =Moderate Exposure* - Stock Chemicals/Solutions: Flammable liquids more than 100ml; all other chemicals more than 100 milllitre liquid or 50 grams solid
* *Low = Low Exposure* - Stock Chemicals/Solutions: Flammable liquids less than 100ml; all other chemicals less than 100 millilitre liquid or 50 grams solid