# Job Safety Analysis

(JSA)

College/Department/Unit: Mechanical Engineering

Title of Job Activity: Mechanical Alloying and Ball Milling Using The Planetary Ball Mill

Location of Activity: 0C19 Engineering Building

Title of worker who does activity: Graduate Student

Supervisor of Activity: Prof. Jerzy Szpunar

Competency Requirements: Laboratory Safety Course, Machine Specific Training (offered by Mr. Seyed Salman Razavi Tousi), knowledge of chemical reactions taking place before, during or after milling.

Monitoring and Measurement:

Date of Original JSA: July 6, 2011

JSA #: Mat00034



JSA Approved by: _____ Date: _____

Prof. Jerzy Szpunar

Review Frequency: Yearly

Review History

| Review Date | Reviewed By | Signature |
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Individual worker sign off for reading and understanding the Job Safety Analysis:

| Date | Name | NSID | Signature |
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| | Seyed Salman Razavi Tousi | | |
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| Basic Job Steps | Possible Hazards | Preventative Measures |
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| PPE Required | | Gloves, glove box or fumehood |
| Prior to Milling | Explosive reaction | Knowledge of what is going to happen in the mill is necessary.<br><br>If there is a possible reaction between air and the materials, the cups should be loaded in a glove box containing an Argon atmosphere.<br><br>Alumina cups cannot be sealed and therefore this should be considered if a reaction with oxygen (air) is possible.<br><br>Examples:<br>1. Al and PbO does not react at room temperature generally, but after milling an explosive reaction will occur at room temperature.<br>2. Titanium powder does not regularly react with air, but after milling a highly exothermic reaction will occur. |
| Use of Liquid Nitrogen to cool cups | Burns and asphyxiation | All safety procedures for handling liquid nitrogen should be followed, see the applicable SOP. |
| Removing the milling cups | Rotating machinery entanglement | After turning off rotation wait until the rotating equipment has come to a full stop before opening the protective covering. |
| Removing the milling cups | Burn hazard | The vials are hot after milling, wait a minimum of 1 hour before removing them, prior to contacting them with your hand check the temperature with a non-contact temperature measurement device. |

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| Opening the milling cups | High pressure release | If there is a possibility of a pressure build up in the cups from milling the pressure must be release slowly (away from your body) before loosening the pullers on the cups. |
| Opening the milling cups | Reaction with Oxygen | If a reaction with oxygen (air) is possible the cups should be opened in a glove box or a fume hood (the choice will depend on the reaction and the results of that reaction) |

Notes:

- This Job Safety Analysis (JSA) is a supplement to the vendor supplied instruction manual, which must be followed.
- If a compressed gas cylinder is used the applicable SOP for compressed gas must be followed.
- This instrument is not suitable for materials that may produce toxic gases. Toxic and radioactive materials cannot be milled with this machine.