

Subject:	NSLS Explosives Training (de minimis quantities)					
Number:	PS-ESH-0091	Revision:	01	Effective:	06/29/2012	Page 1 of 2

The only official copy of this file is the one on-line in the PS Document Center. Before using a printed copy, verify that it is the most current version by checking the document issue date.

Prepared By:	L. Stiegler	Approved By:	A. Ackerman	Approved By:	K. Klaus
--------------	-------------	--------------	-------------	--------------	----------

Explosives Hazards

Experimentation at NSLS may include explosives in small quantities such as PETN, CL-20, HMX, RDX, Fox-7, ammonium nitrate, and others. This training applies to de minimis quantities of explosives, (< 1 mg for primary explosives, and <10 mg for secondary explosives). BNL Explosives Review Committee and Photon Sciences ESH review all experiments in order to assure the least amount of people exposed to the least amount of explosive for the least amount of time.

The energies from these explosives range from 3 – 12 kJ/g. As a comparison, the energy from gasoline is approximately 44 kJ/g. Although the bulk energy is less, explosives expand approximately 1,000 times in milliseconds resulting in a large release of power; approximately 10^{10} W/cm² for explosives as opposed to approximately 10^3 W/cm² for gasoline. The small quantity of explosive material (sub-critical diameter) does not pose a credible detonation hazard, however the energy release could be quite sudden and may present a startle hazard.

Explosives in experimental work at NSLS involve putting the small samples into the X-ray or UV beam, resulting in a slow, controlled energy deposition, which will result in decomposition, not detonation. At some beam lines, the samples are put into Diamond Anvil Cells (DAC) and subjected to high pressure, in order to force controlled degradation. These experiments are well contained within the small DACs.

Handling Precautions

- Due to their unstable natures, explosives should never be exposed to heat, shock, impact and static discharge. All sources of ignition should be removed from the handling area.
- Follow procedures outlined in Safety Approval Form. Ensure all experimenters are familiar with the requirements and controls in the Safety Approval Form.
- Avoid using metal implements such as tongs, tweezers forceps and syringes.
- Keep away from strong acids or alkalis.
- Do not introduce metals or metal salts to explosive materials and solutions.
- Multiple samples should be segregated to the extent possible. Samples must be kept locked or secured when not in use.
- In addition, some explosives are toxic, and the handling of these must include precautions for the toxicity. Review MSDS requirements for handling material safely and PPE requirements.

Emergency Procedures

In case of emergency, secure the beam line if possible, and follow the Building Local Emergency Plan. Contact the Control Room on 2550 for assistance.

Waste

All explosive materials not returned to the home institution shall be disposed as hazardous waste.

Subject:	NSLS Explosives Training (de minimis quantities)					
Number:	PS-ESH-0091	Revision:	01	Effective:	06/29/2012	Page 2 of 2

The only official copy of this file is the one on-line in the PS Document Center. Before using a printed copy, verify that it is the most current version by checking the document issue date.

At least one experimenter or the beam line local contact must complete the BNL Hazardous Waste Generator Training and accept responsibility for proper disposal of the RCRA Hazardous Wastes at the end of the experiment. Please follow these directions.

<http://www.bnl.gov/ps/nsls/esh/waste/directions.aspm>