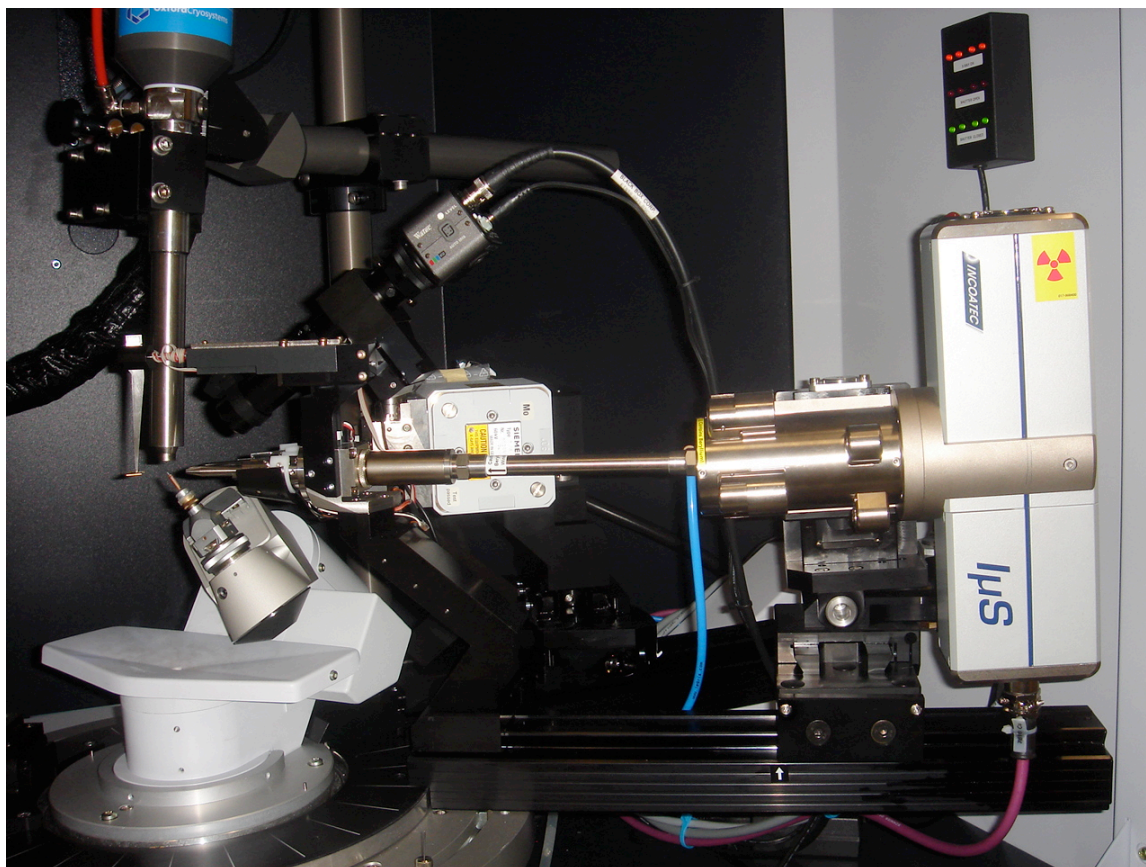


## X-ray Safety Information



**X-ray Crystallographic Facility  
Department of Chemistry  
Boston College**



The safety information outlined in this manual is to ensure compliance with the rules and regulations of Boston College and to provide information concerning radiation safety. It is assumed that the users of this facility have attended the required University Training and are familiar with general radiation safety issues.

## **I. ADMINISTRATION**

The use of all x-ray producing equipments at X-ray Crystallographic Facility, Department of Chemistry, Boston College is under the supervision of facility director. The diffractometer should be operated only by trained faculty, staff or students authorized by facility director.

For safety issues, contact:

Bo Li, X-ray Facility Director, Merkert 209B, (617) 552-1815

Ian B. Parr, Chemistry Safety Officer, Merkert 125, (617) 552-2389

John G. Madden, Assistant Operation Officer, Merkert 125, (617) 552-3608

Sunil Gulab, Associate Radiation Safety Officer, (617) 552-0363.

## **II. TRAINING**

All users of x-ray producing devices are required to participate in BC Radiation Safety Training for x-ray users. New users must enroll in the required initial training course. Sessions are offered by EHS on a regular basis. Please contact the radiation safety officer to register for the training. Users are also required to complete annual refresher training. In addition, all users are required to attend operation and safety training sessions provided by facility directors.

## **III. RADIATION PROTECTION PROCEDURES**

### **A. ALARA**

The goal of this facility is to operate all the x-ray diffractometer in such a manner as to keep doses, to workers and members of the public, **As Low As Reasonably Achievable**. To achieve this goal the facility will:

- Periodically monitor radiation levels;
- Provide sufficient shielding and distance separation;
- Maintain adequate radiation safety records;
- Provide in-depth training;
- Provide facility security and limit access.

### **B. Normal Operating Safety Procedure**

Bruker x-ray diffractometer is equipped with safety interlocks in order to minimize accidental radiation exposure. X-ray survey equipment is used to test for stray radiation

on a daily base by facility director.

#### Preparation:

1. Check all panels and doors are in place and secured before operation of the instrumentation.
2. Check the X-ray tube housing, collimator, water tubes and high voltage cables before operation of the instrument. If any part has been displaced or damaged then close enclosure, shut off the instrument and seek help.
3. Check the X-ray generator before operation of the instrument. If abnormal situation is seen then close enclosure, shut off the instrument and seek help.
4. Check all warning lights are "fail safe".

#### Start the BIS & BCP

5. Test the shutter: a distinct click noise will be heard and the shutter LEDs will change to red. If abnormal operation is seen then shut off the instrument and seek help.
6. Be sure shutter is closed before opening the enclosure door.
7. Check the enclosure safety switches. shutters should not open with door open.
8. Ensure the shutter is closed and mount the sample in the holder. **Keep your hands well below the primary beam area.**
9. Check the detector position and generator settings.

#### During Data Collection

10. Do not open enclosure doors.
11. Do not remove any instrument panels.
12. Avoid movement in or around the instrument.

#### Shutter/Enclosure Safety features

There are two X-ray shutters for each radiation source on the Bruker KAPPA APEX DUO system. The first is the safety shutter that is behind the monochromator and the second is the rotary shutter sit on the collimator.

#### *Shutter Normal Observation:*

- Green 'shutter close' light is seen at the LED on the right panel inside enclosure.
- 'X-Ray On' light on the front columns will be lit.
- Safety shutter opens (loud click sound) and the red 'shutter open' light is seen on the display on the right panel inside enclosure
- Rotary shutter opens and the red diodes on the top front of the rotary shutter assembly will come on.

#### *Enclosure Normal Observation:*

- Green 'X-ray On' and yellow 'Ready' lights on front columns will be on for normal operation.
- 'Alarm' light on the front columns is off for normal operation and Red lights will be blinking if one or more doors of the enclosure are opened.
- Safety shutter will not open if any the red light is lit or blinking.

### Power Connection and Disconnection

Press the RED '0' button on the front columns of the diffractometer will disconnect the power to the x-ray generator. For emergent stop, press the RED 'STOP' button on top of the front columns.

Press the Black button located on the wall next to the x-ray room entrance will disconnect the power to the diffractometer. This switch should be used in case of emergencies.

## **IV. Emergency Response**

In case of emergency

- a) Cease all operations that will put you at risk to exposure
- b) Turn off instrumentation
- c) Close enclosure doors, post warning signs and walk away.
- d) Contact facility director at 552-1815
- e) Call radiation safety 552-0363
- f) In case of severe injury call 2-4444 and seek medical help