

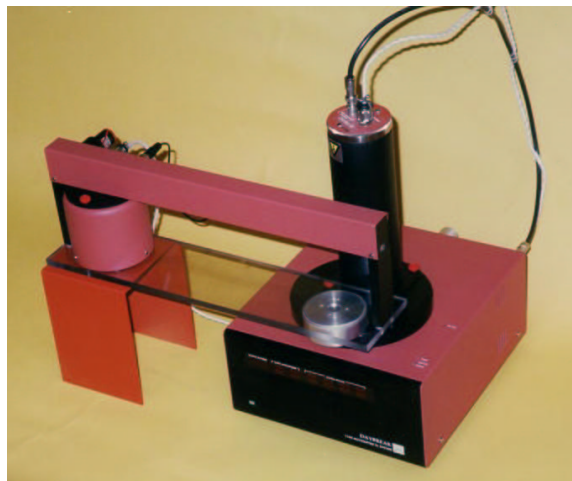
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BETA IRRADIATORS

The 1100 automated system may be purchased with two different beta irradiation options. Both irradiate samples through a beryllium vacuum window 0.25 mm thick, and can use our standard 740 beta irradiator. It has been determined that the loss of beta dose rate due to this window is under 10%. The 1000-series all have an irradiator driver built-in. The simpler option irradiates the samples in place on the sample carrier platter, and is meant solely for normalization where all samples receive the same dose. This is due to an approximately 2 per cent spill-over of exposure to adjacent samples that results from the close sample spacing and relatively little shielding. The other option incorporates a two-position sample elevator that raises the sample off the platter into a shielded volume. There are two positions for flexibility providing a high dose rate for normal irradiations, and a lower dose rate for other purposes such as predose test doses. With a 100 mCi Sr-90 source (activity on ceramic), the dose rate to quartz is approximately 2.2 Gy/min at the high position, 0.6 Gy/min at the low position. The shielding effectively reduces dose to adjacent samples: in the high position, the sample disks next to the one being irradiated receive 0.07% of that dose; in the low position, this becomes 1.0%.



The new 770 beta irradiator transfer mechanism eliminates the increased dark count that results from proximity of the beta source to the PMT. It moves the irradiator (a 740-type with improved shielding) on a trolley 30 cm away behind additional lead shielding. This movement is under software control. The 770 has a polycarbonate base 45 cm long by 10 cm wide with an aperture to accommodate the irradiation port on the 1100, and is easily taken off and replaced. It is meant that the loaded 770 be secured in a locked cabinet when not in use. There is an interlock preventing the shutter from opening unless the irradiator is in place over the irradiation port.

There presently are no irradiation options for the 1150 high capacity system, because only the top platter is accessible. We have implemented top platter irradiation similar to the simple option for the 1100, but would not suggest it for general use.

We have also incorporated a batch irradiation mode in the TLAPPLIC software that performs all irradiations at one time if desired, after which the irradiator is removed, and the measurements begin. This may be suitable for your needs, and the 770 transport arm will then not be necessary. This mode is meant primarily as an adjunct to an external irradiator (801E multiple sample irradiator), for normalization.

It should be mentioned that, as attractive as irradiation on the system appears, there are problems inherent in immediate measurement after irradiation. The most important of these involves anomalous fading. The usual prescription to reduce its effect on ED measurements is to irradiate, then hold at an elevated temperature (75-150C) for a day or more. While it is possible to use the 1100 as a multiple sample irradiator, and then store the samples in an oven, we believe it is a better solution to use a model 801 multiple sample irradiator instead, and be able to do alpha irradiations as well. The long irradiation times for geological samples would keep the 1100 away from its primary job for a substantial portion of the time.

An exception to this is the Single Aliquot OSL technique of Duller, where preheating at a fairly high temperature for about 10 minutes has been used successfully.