



Safety Services

UNDERGRADUATE WORK INVOLVING UNSEALED SOURCES

These guidelines have been drawn up in order to restrict the exposure from radiation to undergraduates to the maximum recommended level for members of the general public, i.e. less than 1mSv per year. The quantities of the isotopes given in the table below are not greater than the annual limit of intake for each radioisotope respectively. Where there is additionally an external hazard, the amount of radioisotope permitted has been further reduced, but some shielding may still be needed to ensure that the instantaneous dose rate, whenever practical, is kept below $2.5\mu\text{Sv h}^{-1}$.

If the conditions specified for class experiments and project work can be met, then the students will not require individual registration as radiation workers. However, there will still be a requirement on the member of teaching staff responsible for the work to register it, through their Radiation Protection Supervisor, with Safety Services, and indicate the number of students involved. A form has been prepared to facilitate this ([ugworkreg.doc](#)).

Prior to any demonstration or experiment involving ionising radiations, the students should be given:

- a) instruction in the basic aspects of radiation protection with the importance of keeping doses as low as reasonably achievable (ALARA) being stressed;
- b) reassurance with regard to the possible health hazards;
- c) a copy of the 'Laboratory Rules - Unsealed Sources' - the importance of adhering to these cannot be over-emphasised., and
- d) in the case of an experiment, written instructions as to its conduct and these should have been approved by the appropriate Departmental Radiation Protection Supervisor.

The provision of information, instruction and training is a specific requirement of Regulation 14 of the Ionising Radiations Regulations 1999.

It is important to remember that all experiments should be carried out with the minimum amount of activity that is practical.

Class Experiments

The amounts specified in column 2 of Table 1 should not normally be exceeded for any one class experiment. Where more than one isotope is being used, then a quantity ratio should be calculated, e.g.

$$80\% \text{ of P-32 limit} = 0.8 \text{ MBq} \quad 20\% \text{ of C-14 limit} = 6 \text{ MBq}$$

Table 1

Radioisotope	Suggested limit for Class Experiments (MBq)	Non-designated area Limit (MBq)	Shielding required for stock material
H-3	150	10000	None
C-14	30	100	None
S-35	15	100	None
P-32	1	1	10mm Perspex
Ca-45	7	100	None
Cr-51	15	100	10mm lead
I-125	1	10	0.25mm lead
I-131	1	10	12.7mm lead

If the amounts in column 2 need to be exceeded, then permission should be sought from the Radiation Protection Adviser before the experiment takes place. If amounts greater than those specified in column 3 of Table 1 are required then it should be borne in mind that the area might well have to be designated as a Supervised Area and this would then mean that the Department would have a responsibility under Regulation 8(2) of the Ionising Radiations Regulations 1999 to provide the students with laboratory coats ('suitable personal protective equipment') instead of them using their own.

The dispensing of the stock material should be performed by a registered radiation worker who should be familiar with the hazards associated with the radioisotope in use and the precautions that need to be taken when handling it.

The students should be under supervision at all times whilst radioactive work is in progress.

Project Work

The use of amounts in excess of those specified in column 2 of Table 1 in any one calendar year will not be permitted for any one student who is not registered as a radiation worker. Where more than one isotope is being used, then a quantity ratio should be calculated as above. If greater amounts are required, then the student should register as a radiation worker and the work will have to be performed under a Work Certificate issued by the Radiation Protection Adviser.

If the work is performed in a Supervised or Controlled Area, then the Department would have a responsibility under Regulation 8(2) of the Ionising Radiations Regulations 1999 to provide the student with 'suitable personal protective equipment'.