

# Appendix 2 Radiation data

## Data on radioisotopes used at Essex

Isotope	Half-life	$\beta$ -energies MeV	$\gamma$ -energies MeV	Comments
Carbon 14	5730 years	0.16	-	20cm range in air
Chromium 51	28 days	-	0.32, 0.24	
Iodine-125	60 days	-	0.04	Volatile!
Krypton 85	10.8 years	0.67	0.51	
Nickel 63	10 years	0.07	-	in ECD of GC machines
Phosphorus 32	14.3 days	1.70	-	700cm range in air
Phosphorus 33	25.4 days	0.25	-	Safer than P-32
Selenium 75	119.8 days		0.4	
Sulphur 35	87.4 days	0.17	-	Volatile!
Tin 119	250 days	0.09	0.02, 0.07	
Tritium H-3	12.3 years	0.02	-	4cm range in air

## Units

The gray (Gy) is the unit of absorbed dose of radioactivity. One gray is an absorbed dose of 1 Joule/kg of tissue. This unit replaces the rad which is equivalent to 0.01 Gy.

The sievert (Sv) is defined as (dose in gray)  $\times$  Q. The Quality Factor (Q) is the factor by which absorbed doses are to be multiplied to obtain, for purposes of radiation protection, a quantity that expresses on a common scale for all ionising radiation, the dose equivalent incurred by exposed persons.

This unit replaces the rem which is equivalent to 0.01Sv.

From; 'Work with Ionising Radiation – Ionising Radiations Regulations 2017' (L121).

<b>Radiation</b>	<b>Q</b>
Photons, all energies ( $\gamma$ rays and X-rays)	1.0
Electrons and muons (all energies)	1.0
Neutrons	Various (see L121 p169)
Protons and charged pions	2.0
Alpha particles, fissions fragments, heavy ions	20.0