Kansas Administrative Regulations

Department of Health and Environment

Article 35.—Radiation—Part 3. Licensing of Sources of Radiation.

28-35-198a. Schedule C; Exempt concentrations.

		Column I	Column II
Element (atomic number)	Isotope	Gas Concentration uCi/ml[1]	Liquid and solid concentration uCi/ml[2]
Antimony (51)	Sb 122		3×10^{-4}
	Sb 124		2×10^{-4}
	Sb 125		1×10^{-3}
Argon (18)	Ar 37	1×10^{-3}	
	Ar 41	4×10^{-7}	
Arsenic (33)	As 73		5×10^{-3}
	As 74		5×10^{-4}
	As 76		2×10^{-4}
	As 77		8×10^{-4}
Barium (56)	Ba 131		2×10^{-3}
	Ba 140		3×10^{-4}
Beryllium (4)	Be 7		2×10^{-2}
Bismuth (83)	Bi 206		4×10^{-4}
Bromine (35)	Br 82	4×10^{-7}	3×10^{-3}
Cadmium (48)	Cd 109		2×10^{-3}

	Cd 115m		3×10^{-4}
	Cd 115		3×10^{-4}
Calcium (20)	Ca 45		9×10^{-5}
	Ca 47		5×10^{-4}
Carbon (6)	C 14	1×10^{-6}	8×10^{-3}
Cerium (58)	Ce 141		9×10^{-4}
	Ce 143		4×10^{-4}
	Ce 144		1×10^{-4}
Cesium (55)	Cs 131		2×10^{-2}
	Cs 134m		6×10^{-2}
	Cs 134		9×10^{-5}
Chlorine (17)	Cl 38	9×10^{-7}	4×10^{-3}
Chromium (24)	Cr 51		2×10^{-2}
Cobalt (27)	Co 57		5×10^{-3}
	Co 58		1×10^{-3}
	Co 60		5×10^{-4}
Copper (29)	Cu 64		3×10^{-3}
Dysprosium (66)	Dy 165		4×10^{-3}
	Dy 166		4×10^{-4}
Erbium (68)	Er 169		9×10^{-4}
	Er 171		1×10^{-3}
Europium (63)	Eu 152 (T/2=9.2 Hrs)		6×10^{-4}

	Eu 155		2×10^{-3}
Fluorine (9)	F 18	2×10^{-6}	8×10^{-3}
Gadolinium (64)	Gd 153		2×10^{-3}
	Gd 159		8×10^{-4}
Gallium (31)	Ga 72	4×10^{-4}	
Germanium (32)	Ge 71	2×10^{-2}	
Gold (79)	Au 196	2×10^{-3}	
	Au 198	5×10^{-4}	
	Au 199	2×10^{-3}	
Hafnium (72)	Hf 181		7×10^{-4}
Hydrogen (1)	H 3	5×10^{-6}	3×10^{-2}
Indium (49)	In 113m		1×10^{-2}
	In 114m		2×10^{-4}
Iodine (53)	I 126	3×10^{-9}	2×10^{-5}
	I 131	3×10^{-9}	2×10^{-5}
	I 132	8×10^{-8}	6×10^{-4}
	I 133	1×10^{-8}	7×10^{-5}
	I 134	2×10^{-7}	1×10^{-3}
Iridium (77)	Ir 190		2×10^{-3}
	Ir 192	4×10^{-4}	
	Ir 194	3×10^{-4}	
Iron (26)	Fe 55	8×10^{-3}	
	Fe 59		6×10^{-4}
Krypton (36)	Kr 85m	1×10^{-6}	

	Kr 85	3×10^{-6}	
Lanthanum (57)	La 140		2×10^{-4}
Lead (82)	Pb 203	4×10^{-3}	
Lutetium (71)	Lu 177	1×10^{-4}	
Manganese (25)	Mn 52	3×10^{-4}	
	Mn 54	1×10^{-3}	
	Mn 56	1×10^{-3}	
Mercury (80)	Hg 197m	2×10^{-3}	
	Hg 197	3×10^{-3}	
	Hg 203	2×10^{-4}	
Molybdenum (42)	Mo 99	2×10^{-3}	
Neodymium (60)	Nd 147	6×10^{-4}	
	Nd 149	2×10^{-3}	
Nickel (28)	Ni 65	1×10^{-3}	
Niobium (Columbium) (41)	Nb 95	1×10^{-3}	
	Nb 97	9×10^{-3}	
Osmium (76)	Os 185	7×10^{-4}	
	Os 191m	3×10^{-2}	
	Os 191	2×10^{-3}	
	Os 193	6×10^{-4}	
Palladium (46)	Pd 103	3×10^{-3}	
	Pd 109	9×10^{-4}	
Phosphorus (15)	P 32		2×10^{-4}

Platinum (78)	Pt 191	1×10^{-3}	
	Pt 193m	1×10^{-2}	
	Pt 197m	1×10^{-2}	
	Pt 197	1×10^{-3}	
Polonium (84)	Po 210		7×10^{-6}
Potassium (19)	K 42		3×10^{-3}
Praseodymium (59)	Pr 142		3×10^{-4}
	Pr 143		5×10^{-4}
Promethium (61)	Pm 147		2×10^{-3}
	Pm 149		4×10^{-4}
Radium (88)	Ra 226		1×10^{-7}
	Ra 228		3×10^{-7}
Rhenium (75)	Re 183		6×10^{-3}
	Re 186		9×10^{-4}
	Re 188		6×10^{-4}
Rhodium (45)	Rh 103m		1×10^{-1}
	Rh 105		1×10^{-3}
Rubidium (37)	Rb 86		7×10^{-4}
Ruthenium (44)	Ru 97		4×10^{-3}
	Ru 103		8×10^{-4}
	Ru 105		1×10^{-3}
	Ru 106		1×10^{-4}
Samarium (62)	Sm 153		8×10^{-4}
Scandium (21)	Sc 46		4×10^{-4}

	Sc 47		9×10^{-4}
	Sc 48		3×10^{-4}
Selenium (34)	Se 75		3×10^{-3}
Silicon (14)	Si 31		9×10^{-3}
Silver (47)	Ag 105		1×10^{-3}
	Ag 110m		3×10^{-4}
	Ag 111		4×10^{-4}
Sodium (11)	Na 24		2×10^{-3}
Strontium (38)	Sr 89		1×10^{-4}
	Sr 85		1×10^{-3}
	Sr 91		7×10^{-4}
	Sr 92		7×10^{-4}
Sulfur (16)	S 35	9×10^{-8}	6×10^{-4}
Tantalum (73)	Ta 182		4×10^{-4}
Technetium (43)	Tc 96m		1×10^{-1}
	Tc 96		1×10^{-3}
Tellurium (52)	Te 125m		2×10^{-3}
	Te 127m		6×10^{-4}
	Te 127		3×10^{-3}
	Te 129m		3×10^{-4}
	Te 131m		6×10^{-4}
	Te 132		3×10^{-4}

Terbium (65)	Tb 160		4×10^{-4}
Thallium (81)	Tl 200		4×10^{-3}
	Tl 201		3×10^{-3}
	Tl 202		1×10^{-3}
	Tl 204		1×10^{-3}
Thulium (69)	Tm 170		5×10^{-4}
	Tm 171		5×10^{-3}
Tin (50)	Sn 113		9×10^{-4}
	Sn 125		2×10^{-4}
Tungsten (Wolf ram) (74)	W 181		4×10^{-3}
	W 187		7×10^{-4}
Vanadium (23)	V 48		3×10^{-4}
Xenon (54)	Xe 131m	4×10^{-6}	
	Xe 133	3×10^{-6}	
	Xe 135	1×10^{-6}	
Ytterbium (70)	Yb 175	1×10^{-3}	
Yttrium (39)	Y 90		2×10^{-4}
	Y 91m		3×10^{-2}
	Y 91		3×10^{-4}
	Y 92		6×10^{-4}
	Y 93		3×10^{-4}
Zinc (30)	Zn 65		1×10^{-3}
	Zn 69m		7×10^{-4}

	Zn 69		2×10^{-2}
Zirconium (40)	Zr 95		6×10^{-4}
	Zr 97		2×10^{-4}
Beta or gamma or both emitting radioactive material not listed above with half-life less than 3 years.		1×10^{-10}	1×10^{-6}

NOTE 1: Many radioisotopes disintegrate into isotopes which are also radioactive. In expressing the concentrations in 28-35-198a, Schedule C, the activity state is that of the parent isotope and takes into account the daughters.

NOTE 2: For purposes of 28-35-192b, when a combination of isotopes is involved, the limit for the combination shall be derived as follows: Determine for each isotope in the product the ratio between the concentration present in the product and the exempt concentration established in 28-35-198a, Schedule C, for the specific isotope when not in combination. The sum of those ratios may not exceed "1" (i.e., unity).

[1] Values are given only for those materials normally used as gases.

[2] uCi/gm for solids.

(Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

***** Authenticated Kansas Administrative Regulation *****