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SUMMARY OF MEASUREMENTS AND CALCULATIONS OF NEUTRON AND GAMMA-RAY
EMISSION SPECTRA FROM SPHERES PULSED WITH 14-MeV NEUTRONS

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ABSTRACT

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A tabulation of the spherical assemblies for which the transport of 14-MeV neutrons have been measured using pulsed sphere and time-of-flight techniques is presented. The description of the measurements and their comparison with the predictions of LLNL Monte Carlo calculations using the ENDL and ENDF (III to V versions) libraries can be found in the publications listed in the references.

MATERIALS AND MEAN FREE PATHS INCLUDED
IN THE PULSED SPHERE MEASUREMENTS

Material	Density [g/cm ³]	Radius [cm]	L[g/cm ²] [†]	mfp ^{††}	Reference
Li-6*	0.447	8.97	3.70	0.507	8,28-30
		16.52	7.04	0.965	
		25.52	11.02	1.51	
Li-7*	0.503	8.97	4.16	0.504	8,28-30
		16.52	7.92	0.959	
		25.52	12.40	1.502	
Be-9*	1.83	4.58(R ₁ -R ₂)	8.38	0.827	8, 28-30
C-Nat	1.873	4.19	7.60	0.518	1,19,28-30
	1.78	10.16	17.85	1.217	
	1.847	20.96	38.47	2.622	
N-Nat	0.808	10.48	8.27	0.567	2,16,17,28-30
		19.05	14.76	1.01	
		55.88	43.86	3.00	
		129.30			
O-Nat	1.14	10.50	11.66	0.735	2,28-30
Mg-Nat	1.74	8.94	14.44	0.649	8,28-30
		16.50	27.60	1.240	
		25.50	43.26	1.943	

Material	Density [g/cm ³]	Radius [cm]	L[g/cm ²] [†]	mfp ^{††}	Reference
Al-27	2.70	8.94	22.41	0.872	15,28-30
		16.50	42.82	1.665	
		25.50	67.12	2.610	
Ti-Nat	4.54	8.94	37.68	1.14	15,28-30
		16.50	72.00	2.18	
		25.50	112.86	3.42	
Fe-Nat	7.85	4.46	31.32	0.87	9,19,28-30
		13.40	101.58	2.82	
		22.30	171.37	4.76	
Cu-Nat	8.96	4.00	32.88	0.916	15,22,29,30
		12.00	103.22	2.875	
		20.00	174.90	4.872	
Nb-93	8.59	4.00	31.53	0.803	22,23,29,30
		14.61	121.19	3.088	
Sn-Nat*	7.22	5.97	39.64	0.908	29
Ho-165*	8.80	4.60	38.32	0.741	26
Ta-Nat*	16.60	3.40	51.13	0.947	26,29,30
		10.20	161.35	2.99	

Material	Density [g/cm ³]	Radius [cm]	L[g/cm ²] [†]	mfp ^{††}	Reference
Au-197*	19.30	6.21	119.85	1.946	26,29,30
Pb-Nat*	11.35	8.97	94.55	1.504	26
Th-232	11.90	5.76	67.71	1.011	22,23,29,30
U-235	18.55	3.145	49.53	0.731	23,28-30
		5.925	109.91	1.493	
U-238	19.04	3.64	60.17	0.960	12,22,23,28-30
		10.91	207.73	3.174	
Pu-239	15.80	3.50	45.35	0.678	23,28-30
		5.36	84.69	1.266	

COMPOUNDS

Material	Density [g/cm ³]	Radius [cm]	L[g/cm ²] [†]	mfp ^{††}	Reference
Polyethylene* (CH ₂)	0.92	16.50	6.96	0.798	8
		25.50	15.24	1.748	
		40.40	28.94	3.322	
Water* (H ₂ O)	1.00	10.48	10.25	1.004	19,28-30
		19.05	18.27	1.791	
Heavy Water* (² H ₂ O)	1.105	10.48	11.30	0.981	8,28-30
		19.05	20.19	1.752	
Liquid Air (79%N,21%O)	0.878	19.05	16.06	0.992	20,31
		55.88	47.50	2.948	
		129.30	113.2		
Teflon* CF ₂	2.22	7.56(R ₁ -R ₂)	16.90	0.978	8
		16.50	35.21	2.052	
		25.50	55.19	3.216	
Concrete**	2.35	21.00	37.37	2.022	10,19
		35.50	71.44	3.865	

- † L is the thickness of the material at 0° traversed by the 14 MeV neutrons.
- †† The mean free paths for 14 MeV neutrons have been calculated using the total cross sections from UCRL-50400. Vol. 16, E. F. Plechaty et al.
- * Recent measurements (1980) with a Stilbene Detector are unpublished.
- ** Composition: (55.72%O, 15.13%H, 14.87%Si, 33.6%Ca, 3.14%C, 1.76%Mg, 1.34%Na, 0.62%Fe, +...)

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