

Article

Fast Neutron and Gamma-Ray Attenuation Properties of Some HMO Tellurite-Tungstate-Antimonate Glasses: Impact of Sm^{3+} Ions

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Table S1. (EBF and EABF) G-P fitting coefficients (b, c, a, X_k and d) of SM0.2 glass sample.

Energy (MeV)	Z_{eq}	G-P Fitting Parameters for EBF					G-P Fitting Parameters for EABF				
		a	b	c	d	X_k	a	b	c	d	X_k
0.015	26.25	-0.533	1.004	1.603	0.344	6.086	-0.533	1.004	1.603	0.344	6.086
0.020	26.39	0.640	1.012	0.126	-0.677	11.307	0.336	1.009	0.254	-0.324	17.453
0.030	26.68	0.194	1.026	0.370	-0.254	25.247	0.251	1.025	0.330	-0.188	17.081
0.040	45.10	0.092	3.791	0.689	-0.070	24.575	0.099	1.559	0.704	-0.037	19.176
0.050	45.55	-0.039	3.285	0.249	-0.080	14.210	0.048	1.502	0.257	-0.045	12.196
0.060	45.80	0.541	2.675	0.118	-0.102	11.298	0.363	1.447	0.139	-0.069	18.021
0.080	49.86	0.810	1.806	0.017	-0.154	15.433	0.730	1.391	0.035	-0.227	14.237
0.100	50.21	0.687	1.398	0.055	-0.317	13.811	0.658	1.341	0.068	-0.353	13.438
0.150	50.71	0.288	1.216	0.316	-0.161	13.927	0.441	1.437	0.173	-0.241	13.848
0.200	51.00	0.175	1.251	0.492	-0.094	14.557	0.336	1.608	0.272	-0.196	13.908
0.300	51.34	0.111	1.385	0.634	-0.053	14.151	0.218	1.895	0.434	-0.124	13.764
0.400	51.53	0.070	1.505	0.771	-0.044	14.135	0.163	2.219	0.566	-0.114	13.868
0.500	51.66	0.047	1.580	0.854	-0.037	14.070	0.115	2.299	0.684	-0.088	13.872
0.600	51.74	0.028	1.616	0.917	-0.026	13.965	0.090	2.341	0.752	-0.074	13.725
0.800	51.84	0.012	1.657	0.981	-0.020	13.971	0.059	2.310	0.843	-0.058	13.624
1.000	51.87	0.005	1.662	1.014	-0.018	13.377	0.044	2.235	0.894	-0.049	13.508
1.500	51.15	-0.019	1.564	1.113	-0.006	14.185	0.010	1.933	1.016	-0.028	13.639
2.000	49.18	-0.016	1.560	1.110	-0.008	13.055	0.017	1.849	0.998	-0.037	13.115
3.000	46.32	0.002	1.538	1.061	-0.031	12.924	0.041	1.716	0.938	-0.065	13.244
4.000	45.06	0.016	1.491	1.028	-0.044	13.388	0.058	1.594	0.900	-0.079	13.568
5.000	44.38	0.046	1.510	0.947	-0.071	13.622	0.087	1.566	0.830	-0.106	13.815
6.000	43.98	0.058	1.492	0.924	-0.081	13.846	0.099	1.514	0.807	-0.117	14.026
8.000	43.46	0.079	1.530	0.885	-0.098	14.152	0.111	1.479	0.796	-0.126	14.300
10.000	43.18	0.057	1.502	0.976	-0.077	14.205	0.087	1.414	0.884	-0.102	14.341

15.000	43.01	0.034	1.576	1.130	-0.059	14.126	0.062	1.407	1.027	-0.085	14.254
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Table S2. (EBF and EABF) G–P fitting coefficients (b, c, a, X_k and d) of SM0.5 glass sample.

Energy (MeV)	Z _{eq}	G-P Fitting Parameters for EBF					G-P Fitting Parameters for EABF				
		a	b	c	d	X _k	a	b	c	d	X _k
0.015	26.28	-0.530	1.004	1.609	0.342	6.151	-0.530	1.004	1.609	0.342	6.151
0.020	26.42	0.641	1.012	0.126	-0.682	11.300	0.337	1.009	0.254	-0.327	17.389
0.030	26.71	0.194	1.026	0.370	-0.251	25.057	0.251	1.025	0.331	-0.188	16.998
0.040	45.04	0.092	3.794	0.682	-0.069	24.552	0.099	1.558	0.697	-0.037	19.252
0.050	45.62	-0.034	3.288	0.253	-0.083	14.253	0.052	1.504	0.260	-0.048	12.270
0.060	45.87	0.531	2.680	0.120	-0.101	11.187	0.355	1.449	0.141	-0.067	18.076
0.080	49.91	0.811	1.807	0.017	-0.154	15.439	0.731	1.392	0.034	-0.227	14.238
0.100	50.27	0.687	1.399	0.055	-0.316	13.817	0.658	1.342	0.068	-0.351	13.445
0.150	50.76	0.288	1.216	0.316	-0.161	13.926	0.442	1.437	0.173	-0.242	13.847
0.200	51.05	0.175	1.250	0.492	-0.094	14.553	0.337	1.607	0.272	-0.197	13.907
0.300	51.39	0.111	1.385	0.633	-0.053	14.148	0.219	1.894	0.434	-0.125	13.761
0.400	51.59	0.070	1.504	0.770	-0.044	14.135	0.163	2.217	0.565	-0.114	13.868
0.500	51.72	0.047	1.579	0.853	-0.037	14.070	0.115	2.297	0.683	-0.088	13.873
0.600	51.80	0.029	1.615	0.916	-0.026	13.963	0.090	2.339	0.751	-0.075	13.725
0.800	51.90	0.012	1.656	0.981	-0.020	13.968	0.060	2.309	0.843	-0.058	13.624
1.000	51.92	0.005	1.661	1.013	-0.018	13.375	0.044	2.234	0.893	-0.049	13.509
1.500	51.21	-0.019	1.564	1.113	-0.006	14.180	0.010	1.933	1.015	-0.029	13.638
2.000	49.24	-0.016	1.560	1.110	-0.008	13.058	0.018	1.849	0.998	-0.037	13.116
3.000	46.38	0.002	1.538	1.061	-0.031	12.925	0.041	1.716	0.938	-0.065	13.244
4.000	45.12	0.016	1.491	1.028	-0.044	13.389	0.058	1.594	0.900	-0.079	13.569
5.000	44.44	0.046	1.510	0.947	-0.071	13.622	0.087	1.566	0.830	-0.106	13.816
6.000	44.04	0.058	1.492	0.924	-0.081	13.847	0.099	1.514	0.807	-0.117	14.027
8.000	43.51	0.079	1.530	0.885	-0.098	14.152	0.111	1.479	0.796	-0.126	14.300
10.000	43.23	0.057	1.502	0.976	-0.077	14.205	0.087	1.414	0.884	-0.102	14.340
15.000	43.06	0.034	1.576	1.131	-0.059	14.124	0.062	1.407	1.027	-0.085	14.253

Table S3. (EBF and EABF) G–P fitting coefficients (b, c, a, X_k and d) of SM0.8 glass sample.

Energy (MeV)	Z _{eq}	G-P Fitting Parameters for EBF					G-P Fitting Parameters for EABF				
		a	b	c	d	X _k	a	b	c	d	X _k
0.015	26.32	-0.527	1.004	1.614	0.341	6.214	-0.527	1.004	1.614	0.341	6.214
0.020	26.46	0.643	1.012	0.126	-0.687	11.293	0.339	1.009	0.254	-0.329	17.326
0.030	26.74	0.194	1.026	0.370	-0.248	24.870	0.251	1.024	0.331	-0.188	16.916
0.040	44.98	0.092	3.797	0.675	-0.069	24.530	0.100	1.556	0.690	-0.037	19.328
0.050	45.69	-0.029	3.291	0.257	-0.086	14.295	0.055	1.506	0.264	-0.052	12.342
0.060	45.94	0.521	2.684	0.122	-0.100	11.077	0.348	1.451	0.143	-0.065	18.131
0.080	49.97	0.811	1.807	0.017	-0.153	15.446	0.732	1.393	0.034	-0.227	14.239
0.100	50.32	0.687	1.400	0.055	-0.314	13.823	0.658	1.343	0.068	-0.350	13.453
0.150	50.82	0.289	1.216	0.315	-0.162	13.924	0.443	1.437	0.172	-0.242	13.846
0.200	51.11	0.175	1.250	0.492	-0.094	14.550	0.337	1.606	0.271	-0.197	13.907
0.300	51.45	0.111	1.384	0.632	-0.053	14.145	0.219	1.894	0.433	-0.125	13.759
0.400	51.64	0.070	1.503	0.770	-0.044	14.135	0.164	2.216	0.565	-0.114	13.868
0.500	51.77	0.048	1.578	0.853	-0.037	14.071	0.116	2.294	0.682	-0.089	13.873
0.600	51.86	0.029	1.614	0.916	-0.026	13.962	0.090	2.337	0.751	-0.075	13.724
0.800	51.95	0.012	1.655	0.980	-0.020	13.964	0.060	2.308	0.842	-0.058	13.624
1.000	51.98	0.005	1.660	1.013	-0.018	13.374	0.044	2.234	0.892	-0.049	13.509
1.500	51.27	-0.019	1.564	1.112	-0.006	14.174	0.010	1.934	1.014	-0.029	13.637
2.000	49.30	-0.016	1.560	1.110	-0.008	13.061	0.018	1.849	0.997	-0.037	13.116
3.000	46.44	0.002	1.537	1.061	-0.031	12.926	0.041	1.716	0.938	-0.065	13.245
4.000	45.18	0.016	1.490	1.028	-0.044	13.389	0.058	1.594	0.900	-0.080	13.570

5.000	44.50	0.046	1.509	0.947	-0.071	13.623	0.087	1.566	0.830	-0.106	13.816
6.000	44.10	0.058	1.492	0.924	-0.081	13.848	0.099	1.514	0.807	-0.117	14.028
8.000	43.57	0.079	1.530	0.885	-0.098	14.152	0.111	1.479	0.796	-0.126	14.301
10.000	43.29	0.057	1.502	0.977	-0.077	14.205	0.087	1.414	0.884	-0.102	14.340
15.000	43.12	0.034	1.576	1.131	-0.059	14.122	0.062	1.407	1.028	-0.085	14.251

Table S4. (EBF and EABF) G–P fitting coefficients (b, c, a, X_k and d) of SM1.0 glass sample.

Energy (MeV)	Z _{eq}	G-P Fitting Parameters for EBF					G-P Fitting Parameters for EABF				
		a	b	c	d	X _k	a	b	c	d	X _k
0.015	26.34	-0.525	1.004	1.618	0.341	6.256	-0.525	1.004	1.618	0.341	6.256
0.020	26.48	0.644	1.011	0.125	-0.690	11.288	0.340	1.009	0.253	-0.331	17.285
0.030	26.76	0.194	1.026	0.370	-0.247	24.746	0.251	1.024	0.332	-0.188	16.861
0.040	44.94	0.091	3.799	0.671	-0.068	24.515	0.100	1.555	0.685	-0.038	19.377
0.050	45.73	-0.026	3.293	0.259	-0.087	14.322	0.058	1.508	0.267	-0.054	12.390
0.060	45.99	0.514	2.687	0.124	-0.100	11.005	0.343	1.452	0.145	-0.064	18.168
0.080	50.00	0.811	1.808	0.017	-0.153	15.450	0.733	1.393	0.034	-0.227	14.240
0.100	50.36	0.687	1.400	0.055	-0.314	13.826	0.658	1.343	0.068	-0.348	13.457
0.150	50.85	0.290	1.216	0.314	-0.162	13.923	0.444	1.437	0.172	-0.242	13.846
0.200	51.14	0.175	1.249	0.491	-0.094	14.548	0.338	1.606	0.271	-0.197	13.906
0.300	51.48	0.112	1.383	0.632	-0.053	14.143	0.220	1.893	0.432	-0.125	13.758
0.400	51.68	0.071	1.502	0.769	-0.044	14.135	0.164	2.215	0.564	-0.114	13.867
0.500	51.81	0.048	1.577	0.853	-0.037	14.071	0.116	2.293	0.682	-0.089	13.873
0.600	51.89	0.029	1.614	0.915	-0.026	13.960	0.090	2.336	0.750	-0.075	13.724
0.800	51.99	0.012	1.655	0.980	-0.020	13.962	0.060	2.307	0.841	-0.058	13.624
1.000	52.02	0.005	1.660	1.012	-0.018	13.373	0.044	2.233	0.892	-0.049	13.509
1.500	51.30	-0.019	1.564	1.112	-0.006	14.170	0.011	1.935	1.013	-0.029	13.636
2.000	49.34	-0.016	1.559	1.109	-0.008	13.064	0.018	1.849	0.997	-0.037	13.116
3.000	46.48	0.002	1.537	1.061	-0.031	12.927	0.042	1.716	0.937	-0.065	13.245
4.000	45.22	0.016	1.490	1.028	-0.044	13.390	0.058	1.594	0.900	-0.080	13.571
5.000	44.54	0.046	1.509	0.947	-0.071	13.624	0.087	1.566	0.830	-0.106	13.817
6.000	44.14	0.058	1.492	0.924	-0.081	13.848	0.099	1.514	0.807	-0.117	14.028
8.000	43.61	0.079	1.530	0.886	-0.098	14.152	0.111	1.479	0.796	-0.126	14.301
10.000	43.33	0.057	1.502	0.977	-0.077	14.205	0.087	1.414	0.884	-0.102	14.339
15.000	43.16	0.034	1.576	1.132	-0.059	14.121	0.062	1.407	1.028	-0.085	14.250

Table S5. (EBF and EABF) G–P fitting coefficients (b, c, a, X_k and d) of SM1.5 glass sample.

Energy (MeV)	Z _{eq}	G-P Fitting Parameters for EBF					G-P Fitting Parameters for EABF				
		a	b	c	d	X _k	a	b	c	d	X _k
0.015	26.39	-0.521	1.004	1.627	0.339	6.360	-0.521	1.004	1.627	0.339	6.360
0.020	26.53	0.647	1.011	0.125	-0.699	11.277	0.342	1.009	0.253	-0.335	17.182
0.030	26.81	0.194	1.026	0.370	-0.242	24.440	0.251	1.024	0.333	-0.187	16.727
0.040	44.84	0.091	3.803	0.660	-0.067	24.478	0.100	1.553	0.674	-0.038	19.501
0.050	45.84	-0.017	3.299	0.265	-0.091	14.391	0.064	1.512	0.273	-0.059	12.508
0.060	46.11	0.498	2.695	0.127	-0.099	10.821	0.330	1.456	0.148	-0.060	18.260
0.080	50.09	0.798	1.811	0.020	-0.150	15.463	0.722	1.396	0.037	-0.223	14.238
0.100	50.45	0.686	1.401	0.055	-0.311	13.836	0.658	1.345	0.067	-0.346	13.469
0.150	50.94	0.291	1.215	0.313	-0.163	13.920	0.445	1.437	0.171	-0.243	13.844
0.200	51.23	0.175	1.249	0.491	-0.094	14.542	0.339	1.604	0.270	-0.198	13.905
0.300	51.57	0.112	1.382	0.631	-0.053	14.138	0.221	1.892	0.431	-0.126	13.754
0.400	51.77	0.071	1.500	0.768	-0.045	14.135	0.164	2.212	0.563	-0.115	13.867
0.500	51.90	0.048	1.575	0.852	-0.037	14.071	0.116	2.289	0.681	-0.089	13.873
0.600	51.98	0.029	1.612	0.914	-0.027	13.958	0.091	2.333	0.749	-0.075	13.724
0.800	52.08	0.013	1.653	0.979	-0.020	13.956	0.060	2.305	0.840	-0.058	13.624
1.000	52.10	0.005	1.659	1.012	-0.018	13.370	0.045	2.232	0.891	-0.050	13.509

1.500	51.40	-0.018	1.563	1.111	-0.006	14.161	0.011	1.936	1.011	-0.029	13.635
2.000	49.44	-0.016	1.559	1.109	-0.008	13.069	0.018	1.849	0.997	-0.038	13.117
3.000	46.58	0.002	1.537	1.061	-0.031	12.929	0.042	1.716	0.937	-0.065	13.246
4.000	45.32	0.016	1.490	1.028	-0.044	13.391	0.058	1.593	0.899	-0.080	13.572
5.000	44.63	0.046	1.509	0.947	-0.071	13.625	0.087	1.566	0.830	-0.106	13.818
6.000	44.23	0.058	1.492	0.925	-0.081	13.850	0.100	1.514	0.807	-0.117	14.030
8.000	43.70	0.079	1.530	0.886	-0.098	14.152	0.111	1.479	0.796	-0.126	14.301
10.000	43.42	0.057	1.502	0.978	-0.077	14.204	0.087	1.414	0.885	-0.102	14.339
15.000	43.25	0.033	1.576	1.133	-0.059	14.118	0.062	1.407	1.029	-0.085	14.248
