



LiF:Mg,Cu,P Physical Data and Constants

We are often asked about the physical constants of the LiF:Mg,Cu,P materials. For those making Monte-Carlo calculations or those developing their own algorithms knowing a few basic parameters is essential. The data presented on this sheet has been measured here at Bicon, is documented in the Handbook of Chemistry and Physics published by the CRC press, Inc. or derived by calculation and is noted by the key below.

Physical Constants

Element or Isotope	Density g/cc	Atomic Weight ¹ amu
Natural Li		6.941
⁶ Li		6.015
⁷ Li		7.016
F		18.998
Natural LiF	2.635 ¹	
⁶ LiF	2.55 +/- 0.01 ²	
⁷ LiF	2.65 +/- 0.01 ²	
Mg		24.305
Cu		63.546
P		30.974

For those using the isotopically enriched products, products containing ⁶Li or ⁷Li, special detail has been included. Of note are the enrichment figures included in the compositional table and the variations in density presented in the physical constants table. The dopant concentration figures, although reported by weight and influenced by the enrichment of the lithium, have not been varied because of the approximate nature of the data.

Densities are reported for both volume and area calculations. Since LiF:Mg,Cu,P is a porous product, less than 100% dense, the calculation to volume and surface densities cannot be directly calculated. Direct measurements must be made. In all cases data for the hot-pressed, ^{Nat}LiF:Mg,Ti product has been included as a benchmark for making relative comparisons.

Composition by Weight

Material		⁷ LiF %	⁶ LiF %	Mg ppm	Cu ppm	P ppm
TLD-100H	^{Nat} LiF: Mg,Cu,P	~92.14	~7.36	~2000	<=40	~3000
TLD-600H	⁶ LiF: Mg,Cu,P	~4.38	~95.12	~2000	<=40	~3000
TLD-700H	⁷ LiF: Mg,Cu,P	~99.47	<0.03	~2000	<=40	~3000
TLD-100	^{Nat} LiF: Mg,Ti	~92.14	~7.36	~200	<u>Ti</u> : ~10	

Area Density Data

Product	Area Density, mg/cm ² ; F(thickness)			
	0.010"	0.015"	0.024"	
TLD-100H	^{Nat} LiF: Mg,Cu,P	63	94	151
TLD-600H	⁶ LiF: Mg,Cu,P	61	91	146
TLD-700H	⁷ LiF: Mg,Cu,P	63	95	152
TLD-100	^{Nat} LiF: Mg,Ti	67	100	161

Density Data

Product	Density
TLD-100H	^{Nat} LiF: Mg,Cu,P 2.48 g/cc ⁴ or ~94%
TLD-600H	⁶ LiF: Mg,Cu,P 2.40 g/cc ⁴ or ~94%
TLD-700H	⁷ LiF: Mg,Cu,P 2.49 g/cc ⁴ or ~94%
TLD-100	^{Nat} LiF: Mg,Ti 2.64 g/cc ⁴ or 100%

Key:

- 1 CRC
- 2 Measured at Bicon/Harshaw
- 3 Calculated or estimated
- 4 Typical