Properties of LAr

All values are on the liquid-vapor saturation line and at E=500 V/cm unless otherwise indicated.

Quantity	Symbol	Value	Units	Comments or [Ref]
Atomic number	Z	18		
Atomic weight	A	39.948(1)	g/mol	
Isotopic composition	A=36, 38, 40 stable; 39, 42 $t_{1/2}$>1y			[1, 2,3]
Thermodynamic properties				
Normal boiling point	T_{NBP}	87.303(2)	K	[4]
Density	ρ_{NBP}	1.396(1)	g/ml	[4]
Vapor/liquid volume ratio	V(g)/V(l)	241.7	none	At T_{NBP} [5]
Normal freezing point	T_{FUS}	83.8(3)	K	[4]
Temperature at triple point	T_{TRIPLE}	83.8058	K	ITS-90 def. [4]
Pressure at triple point	P_{TRIPLE}	0.68891(2)	bar	[4]
Density at triple point	ρ_{TRIPLE}	1.417	g/ cm^3	[5]
Temperature at critical point	T_C	150.687(15)	K	[4]
Pressure at critical point	P_C	48.63(3)	bar	[4]
Density at critical point	ρ_C	0.5356(10)	g/ cm^3	[4]
Heat of vaporization	ΔH_{VAP}	161.14	kJ/kg	[5]
Heat capacity	C_P	1.117	kJ/kg/K	[5]
Thermal conductivity	K	0.1256	W/m/K	[5]
Viscosity	η	270.7	μPa s	[5]
Speed of sound	v_S	838.3(1)	m/s	[5]
Response to electromagnetic radiation				
Dielectric constant	ε	1.505(3)		[6,7]
Index of refraction	n	1.38		At 128 nm [8,9,10]
Rayleigh scattering length	L_R	95	cm	At 128 nm [11,12,13]
Absorption length	L_A	>200	cm	For λ>128 nm
Response to ionizing radiation				
W-value for ionization	W_I	23.6(3)	eV/pair	mip [14, 15]
W-value for scintillation	W_S	19.5(10)	eV/photon	mip [16]
W-value for Cerenkov radiation	W_C	2700	eV/photon	β=1 [17]
Fano factor	F	0.107	none	[18]
Moliere radius	R_M	10.0	cm	[19]
Radiation length	X_0	14.0	cm	[19]
Nuclear interaction length	λ_I	85.7	cm	[19]
Critical energy	E_C	30.5	MeV	[19]
Minimum specific energy loss	dE_{MIP}/dx	2.12	MeV/cm	[19]
Scintillation emission peak	λ_{SCINT}	128(10)	nm	[20]
Decay time	τ_{SCINT}	6(2), 1590(100)	ns	[21]