

Table 4. Properties of various impurities in Si (according to Mühlbauer<sup>227)</sup>, Seidensticker and Hopkins<sup>228)</sup>, Rohatgi et al.<sup>229)</sup> and Nozaki et al.<sup>10)</sup>)

Element	Distribution Coefficient $k_0$ or ( $k_{eff}$ )	Maximum Solid Solubility at/cm <sup>3</sup>	Temperature at Max. Solubility °C	Diffusion Coefficient in the Melt cm <sup>2</sup> /s	Evaporation Rate cm/s	Tetrahedral Covalent Radius Å
Lithium	$1 \times 10^{-2}$	$6.5 \times 10^{19}$	1200	—	—	1.23
Hydrogen	—	$1.7 \times 10^{19}$	—	—	—	0.30
Copper	$4 \times 10^{-4}$	$1.5 \times 10^{18}$	1300	—	$4 \times 10^{-5}$ $8 \times 10^{-5}$	1.35
Silver	$\sim 1 \times 10^{-6}$	$2 \times 10^{17}$	1350	—	$8 \times 10^{-4}$	1.53
Gold	$2.5 \times 10^{-5}$	$1.2 \times 10^{17}$	1300	—	$1.5 \times 10^{-5}$	1.50
Zinc	$\sim 1 \times 10^{-5}$	$6 \times 10^{16}$	1325	—	—	1.31
Cadmium	$\sim 1 \times 10^{-6}$	—	—	—	—	1.48
Boron	$8 \times 10^{-1}$	$1 \times 10^{21}$ $6 \times 10^{20}$	1410	$2.4 \times 10^{-4}$	$8 \times 10^{-6}$	0.88
Aluminium	$2 \times 10^{-3}$	$2 \times 10^{19}$ $5 \times 10^{20}$	1100 1030	$7.0 \times 10^{-4}$ $2.3 \times 10^{-5}$	$1.6 \times 10^{-4}$	1.26
Gallium	$8 \times 10^{-3}$	$4 \times 10^{19}$	1250	$4.8 \times 10^{-4}$	$2 \times 10^{-3}$	1.26
Indium	$4 \times 10^{-4}$	$4 \times 10^{17}$	—	$6.9 \times 10^{-4}$	$8 \times 10^{-3}$	1.44
Thallium	$1.7 \times 10^{-4}$	—	—	$7.8 \times 10^{-4}$	—	1.47
Carbon	$6 \times 10^{-2}$ $7 \times 10^{-2}$	— $3.5 \times 10^{17}$	— 1410	— $\sim 2 \times 10^{-4}$	—	0.77
Germanium	$3.3 \times 10^{-1}$	—	—	—	—	1.22
Tin	$1.6 \times 10^{-2}$	$5 \times 10^{19}$	1200	—	—	1.40
Nitrogen	$7 \times 10^{-4}$	$5 \times 10^{15}$	1400	—	—	0.70
Phosphorus	$3.5 \times 10^{-1}$	$1.3 \times 10^{21}$	1200	$2.3 \times 10^{-4}$ $5.1 \times 10^{-4}$ $3.3 \times 10^{-4}$ $2.4 \times 10^{-4}$	$1.6 \times 10^{-4}$ $4 \times 10^{-4}$ $4.7 \times 10^{-4}$	1.10
Arsenic	$3 \times 10^{-1}$	$1.8 \times 10^{21}$	1150	—	—	1.18
Antimony	$2.3 \times 10^{-2}$	$7 \times 10^{19}$	1325	$1.5 \times 10^{-4}$	$1.3 \times 10^{-1}$	1.36
Bismuth	$7 \times 10^{-4}$	$8 \times 10^{17}$	1325	—	—	1.46
Oxygen	1.40	$2 \times 10^{18}$	1410	$3.3 \times 10^{-4}$	—	0.66
Sulfur	$\sim 1 \times 10^{-5}$	$3 \times 10^{16}$	1325	$2.4 \times 10^{-4}$	—	1.04
Chromium	$(2.8 \times 10^{-5})$	—	—	—	—	—
Titanium	$(9 \times 10^{-6})$	—	—	—	—	—
Vanadium	$(1 \times 10^{-5})$	—	—	—	—	—
Manganese	$\sim 1 \times 10^{-5}$	$3 \times 10^{16}$	1325	—	$4 \times 10^{-4}$	—
Iron	$8 \times 10^{-6}$	$3 \times 10^{16}$	1325	—	$4 \times 10^{-5}$	—
Cobalt	$8 \times 10^{-6}$	$2.3 \times 10^{16}$	1325	—	$2.1 \times 10^{-5}$	—
Nickel	$3 \times 10^{-5}$	$8 \times 10^{17}$	1300	—	—	—
Molybdenum	$(4.5 \times 10^{-8})$	—	—	—	—	—
Tantalum	$1 \times 10^{-7}$	—	—	—	—	—
Platinum	—	$> 4 \times 10^{17}$	—	—	—	—

1. 사용 재료: 11N POLY Silicon

2. 열전도도 : 1.5kth[w/(cm °C)]

3. 비열 : 0.7Cp[J/(g °C)]

4. 밀도 : 2.33(g/cm³)