

Isotopes of silicon

From Wikipedia, the free encyclopedia

[Jump to navigation](#)[Jump to search](#)

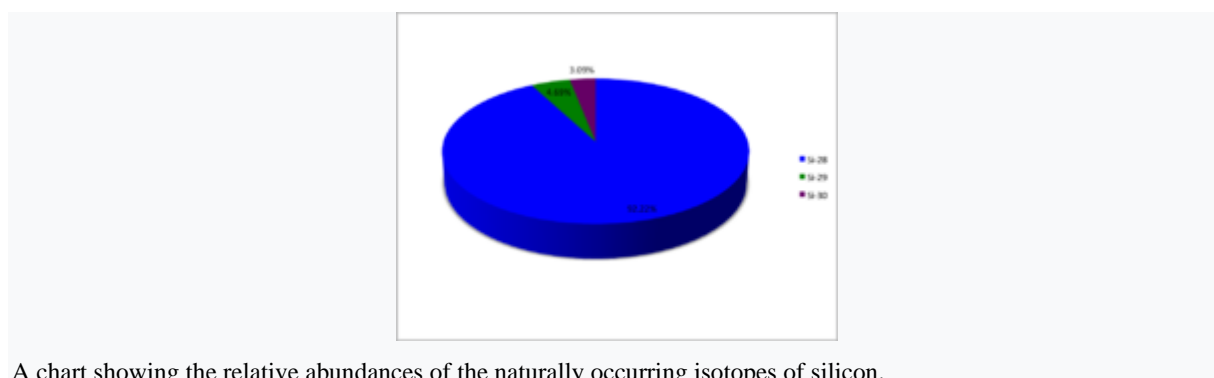
Main isotopes of silicon (¹⁴ Si)				
	Isotope		Decay	
	abundance	half-life (<i>t</i> _{1/2})	mode	product
²⁸ Si	92.2%	stable		
²⁹ Si	4.7%	stable		
³⁰ Si	3.1%	stable		
³¹ Si	trace	2.62 h	β [−]	³¹ P
³² Si	trace	153 y	β [−]	³² P

Standard atomic weight *A*_{r,standard}(Si) [28.084, 28.086]

weight *A*_{r,standard}(Si) conventional: 28.085^{[1][2]}

- [view](#)
- [talk](#)
- [edit](#)

Silicon (¹⁴Si) has 23 known **isotopes**, with **mass numbers** ranging from 22 to 44. ²⁸Si (the most abundant isotope, at 92.23%), ²⁹Si (4.67%), and ³⁰Si (3.1%) are stable. The longest-lived radioisotope is ³²Si, which is produced by **cosmic ray spallation** of **argon**. Its **half-life** has been determined to be approximately 150 years (with **decay energy** 0.21 MeV), and it decays by **beta emission** to ³²P (which has a 14.28-day half-life)^[3] and then to ³²S. After ³²Si, ³¹Si has the second longest half-life at 157.3 minutes. All others have half-lives under 7 seconds.



A chart showing the relative abundances of the naturally occurring isotopes of silicon.

List of isotopes[\[edit\]](#)

Nuclide ^[4] <small>[n 1]</small>	Z	N	Isotopic mass (Da) ^[5] <small>[n 2][n 3]</small>	Half-life <small>[n 4]</small>	Decay mode <small>[n 5]</small>	Daughter isotope <small>[n 6]</small>	Spin and parity <small>[n 7][n 4]</small>	Natural abundance (mole fraction)	
								Normal proportion	Range of variation
			Excitation energy						
²² Si	14	8	22.03579(54)#	29(2) ms	β^+ (67.6%)	²² Al	0+		
					β^+ , p (32.4%)	²¹ Mg			
²³ Si	14	9	23.02544(54)#	42.3(4) ms	β^+ (12%)	²³ Al	3/2+#		
					β^+ , p (88%)	²¹ Mg			
²⁴ Si	14	10	24.011535(21)	140(8) ms	β^+ (62.4%)	²⁴ Al	0+		
					β^+ , p (37.6%)	²³ Mg			
²⁵ Si	14	11	25.004109(11)	220(3) ms	β^+ (64.8%)	²⁵ Al	5/2+		
					β^+ , p (35.2%)	²⁴ Mg			
²⁶ Si	14	12	25.9923338(12)	2.2453(7) s	β^+	²⁶ Al	0+		
²⁷ Si	14	13	26.98670469(12)	4.15(4) s	β^+	²⁷ Al	5/2+		
²⁸ Si	14	14	27.9769265350(5)	Stable			0+	0.92223(19)	0.92205–0.92241
²⁹ Si	14	15	28.9764946653(6)	Stable			1/2+	0.04685(8)	0.04678–0.04692

³⁰ Si	14	16	29.973770137(23)	Stable			0+	0.03092(11)	0.03082–0.03102
³¹ Si	14	17	30.97536319(5)	157.36(26) min	β ⁻	³¹ P	3/2+		
³² Si	14	18	31.9741515(3)	153(19) y	β ⁻	³² P	0+	trace	cosmogenic
³³ Si	14	19	32.9779770(8)	6.18(18) s	β ⁻	³³ P	(3/2+)		
³⁴ Si	14	20	33.978575(15)	2.77(20) s	β ⁻	³⁴ P	0+		
^{34m} Si	4256.1(4) keV			<210 ns	IT	³⁴ Si	(3 ⁻)		
³⁵ Si	14	21	34.98455(4)	780(120) ms	β ⁻ (94.74%)	³⁵ P	7/2 ⁻ #		
³⁶ Si	14	22	35.98665(8)	450(60) ms	β ⁻ (87.5%)	³⁶ P	0+		
					β ⁻ , n (12.5%)	³⁵ P			
³⁷ Si	14	23	36.99295(12)	90(60) ms	β ⁻ (83%)	³⁷ P	(7/2 ⁻)#		
					β ⁻ , n (17%)	³⁶ P			
³⁸ Si	14	24	37.99552(11)	90# ms [>1 μs]	β ⁻ , n	³⁷ P	0+		
					β ⁻	³⁸ P			
³⁹ Si	14	25	39.00249(15)	47.5(20) ms	β ⁻	³⁹ P	7/2 ⁻ #		
⁴⁰ Si	14	26	40.00583(37)	33.0(10) ms	β ⁻	⁴⁰ P	0+		
⁴¹ Si	14	27	41.01301(60)	20.0(25) ms	β ⁻	⁴¹ P	7/2 ⁻ #		

^{42}Si	14	28	42.01768(54)#	12.5(35) ms	β^-	^{42}P	0+		
^{43}Si	14	29	43.02480(64)#	15# ms [>260 ns]			3/2-#		
^{44}Si	1 4	3 0	44.03061(64)#	10# ms			0+		