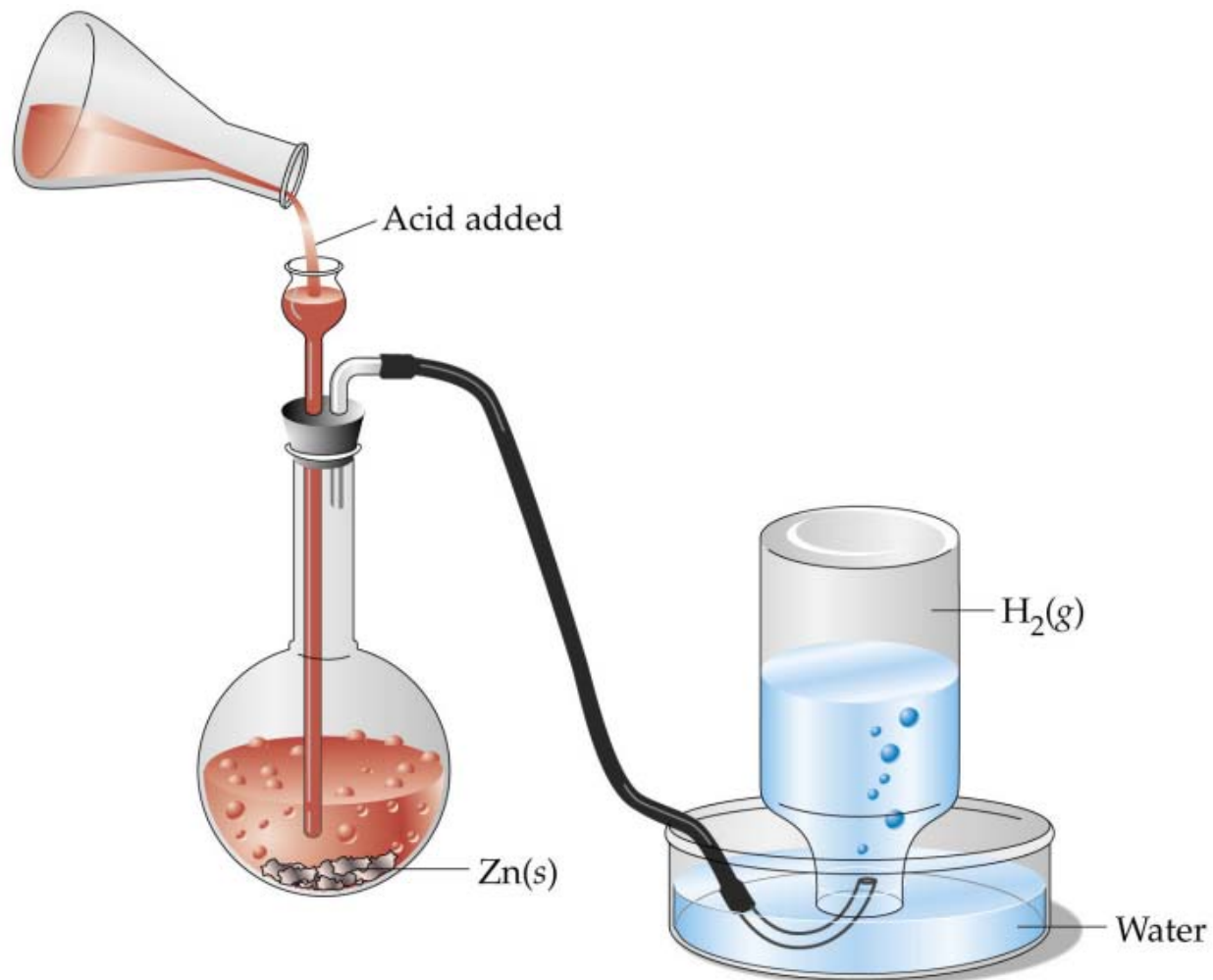


Darstellung von Wasserstoff im Labor



Verbindungen des Wasserstoffs

1 1A	2 2A		13 3A	14 4A	15 5A	16 6A	17 7A	18 8A
LiH 692	BeH ₂ d 250		B ₂ H ₆ -165	CH ₄ -182	NH ₃ -78	H ₂ O 0	HF -83	
NaH d 800	MgH ₂ d 280		AlH ₃ d 150	SiH ₄ -185	PH ₃ -134	H ₂ S -86	HCl -115	
KH d	CaH ₂ 816		GaH ₃ -15	GeH ₄ -165	AsH ₃ -116	H ₂ Se -66	HBr -88	
RbH d	SrH ₂ d 675		InH ₃ (?)	SnH ₄ -146	SbH ₃ -88	H ₂ Te -51	HI -51	
CsH d	BaH ₂ d 675		TlH ₃ (?)	PbH ₄	BiH ₃	H ₂ Po	HAt	

Elektronegativitäten (nach Pauling)

$$|EN_X - EN_Y| = D(XY) - \sqrt{D(X_2) \cdot D(Y_2)}$$

D = Dissoziationsenergie in eV

1 H 2,2						
3 Li 1,0	4 Be 1,6	5 B 2,0	6 C 2,6	7 N 3,0	8 O 3,4	9 F 4,0
11 Na 0,9	12 Mg 1,3	13 Al 1,6	14 Si 1,9	15 P 2,2	16 S 2,6	17 Cl 3,2
19 K 0,8	20 Ca 1,0	31 Ga 1,8	32 Ge 2,0	33 As 2,2	34 Se 2,6	35 Br 3,0
37 Rb 0,8	38 Sr 0,9	49 In 1,8	50 Sn 2,0	51 Sb 2,1	52 Te 2,1	53 I 2,7

TABLE 19.3

Properties of the Group 3A Elements

Property	Boron	Aluminum	Gallium	Indium	Thallium
Valence electron configuration	$2s^2 2p^1$	$3s^2 3p^1$	$4s^2 4p^1$	$5s^2 5p^1$	$6s^2 6p^1$
Common oxidation states	+3	+3	+3	+3	+3, +1
Atomic radius (pm)	83	143	135	167	170
M^{3+} ionic radius (pm)		51	62	81	95
First ionization energy (kJ/mol)	801	578	579	558	589
Electronegativity	2.0	1.5	1.6	1.7	1.8
Redox potential, E° (V) for $M^{3+}(aq) + 3 e^- \rightarrow M(s)$	-0.87^*	-1.66	-0.56	-0.34	$-0.34^\dagger$

* E° for the reaction $B(OH)_3(aq) + 3 H^+(aq) + 3 e^- \rightarrow B(s) + 3 H_2O(l)$

† E° for the reaction $Tl^+(aq) + e^- \rightarrow Tl(s)$

Bau von Diboran (Borhydrid): B_2H_6 (Dreizentrenbindung)

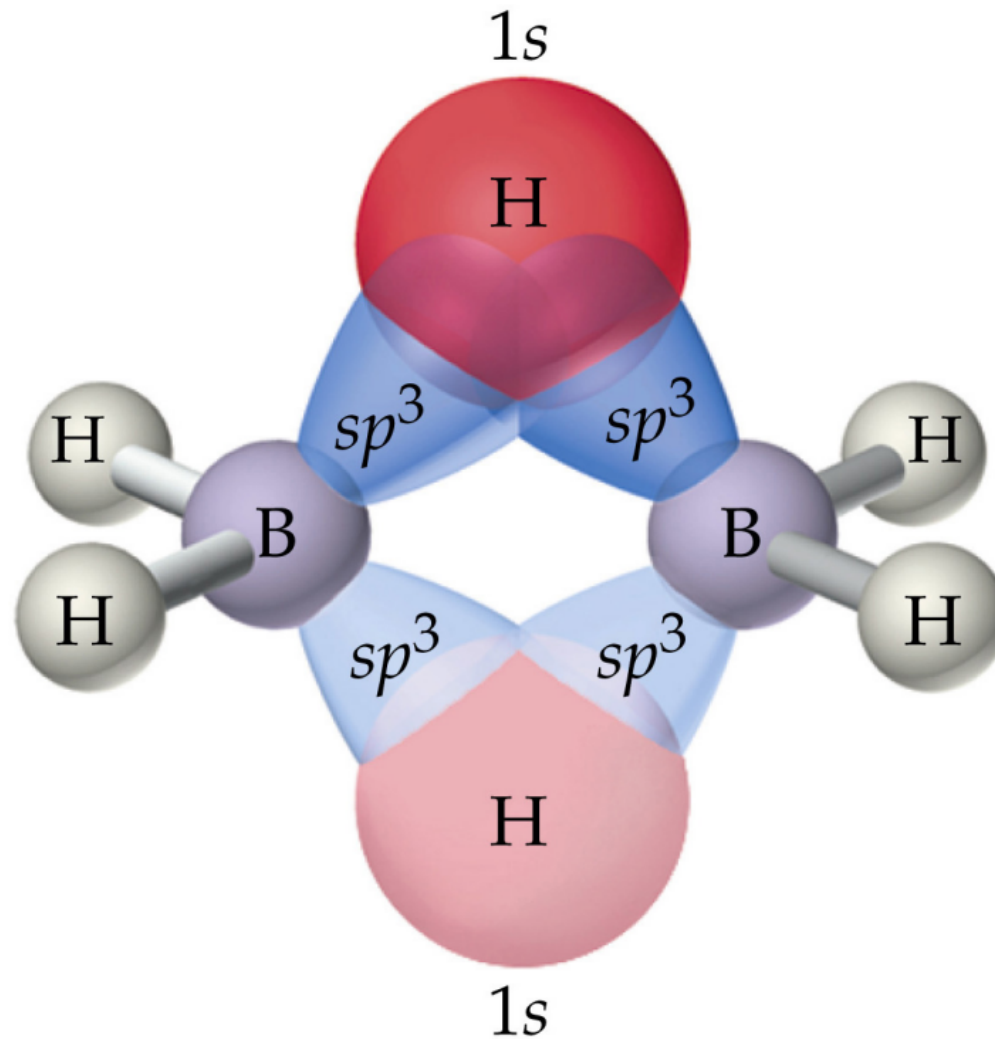


TABLE 19.4

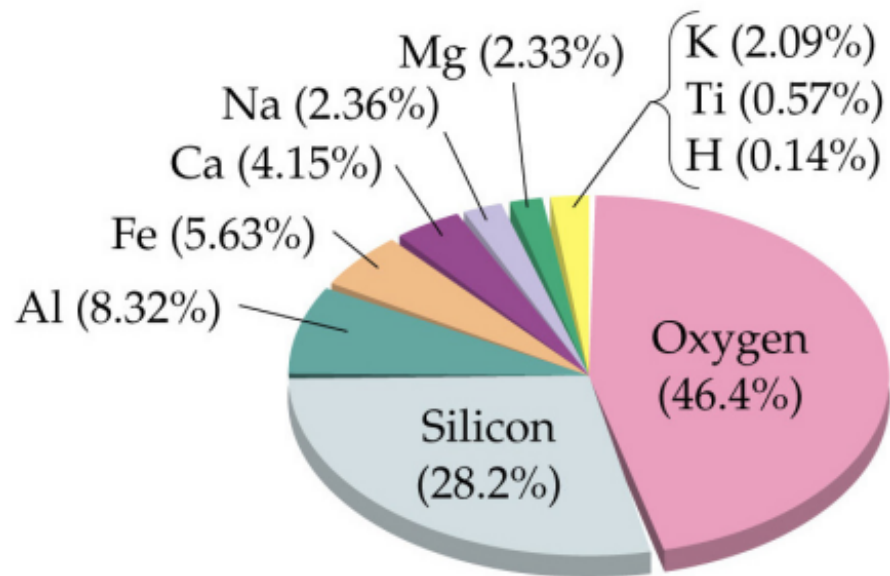
Properties of the Group 4A Elements

Property	Carbon	Silicon	Germanium	Tin	Lead
Valence electron configuration	$2s^2 2p^2$	$3s^2 3p^2$	$4s^2 4p^2$	$5s^2 5p^2$	$6s^2 6p^2$
Melting point (°C)	>3550*	1414	938	232 [†]	327
Boiling point (°C)		3265	2833	2602	1749
Density (g/cm ³)	3.51*	2.33	5.32	7.26 [†]	11.3
Abundance in Earth's crust (mass %)	0.020	28.2	0.0005	0.0002	0.0013
Common oxidation states	+2, +4	+4	+4	+2, +4	+2, +4
Atomic radius (pm)	77	117	122	140	175
First ionization energy (kJ/mol)	1086	786	762	709	716
Electronegativity	2.5	1.8	1.8	1.8	1.9
Redox potential, E° (V) for $M^{2+}(aq) + 2 e^- \rightarrow M(s)$				-0.14	-0.13

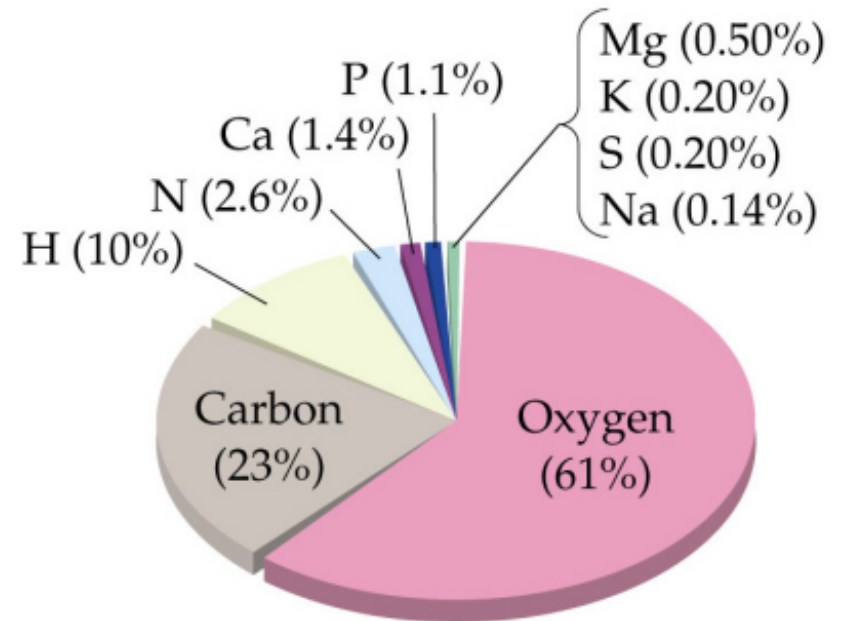
*Diamond

[†]White Sn

Vorkommen der Elemente: a) auf der Erde, b) im Menschen

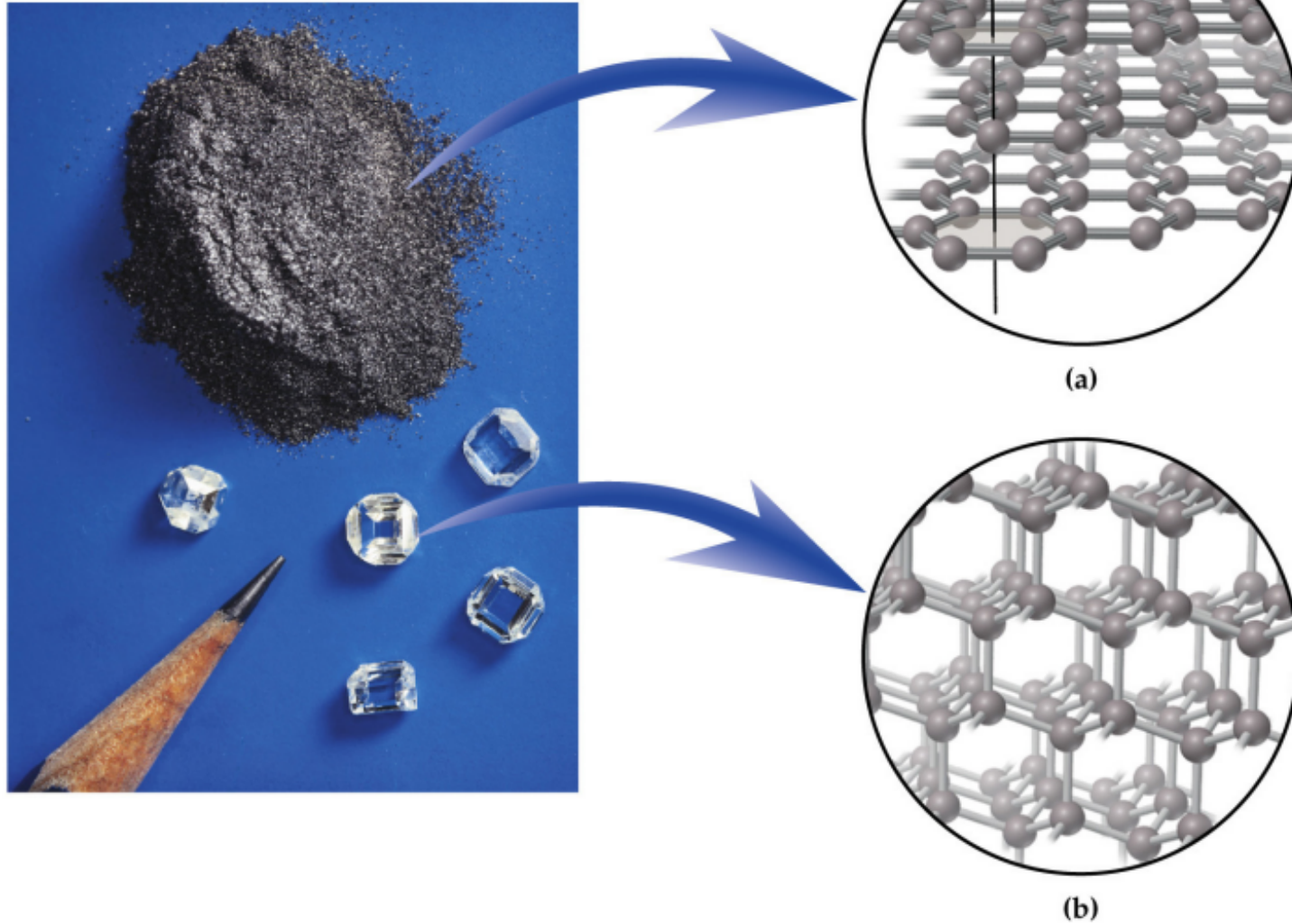


(a)

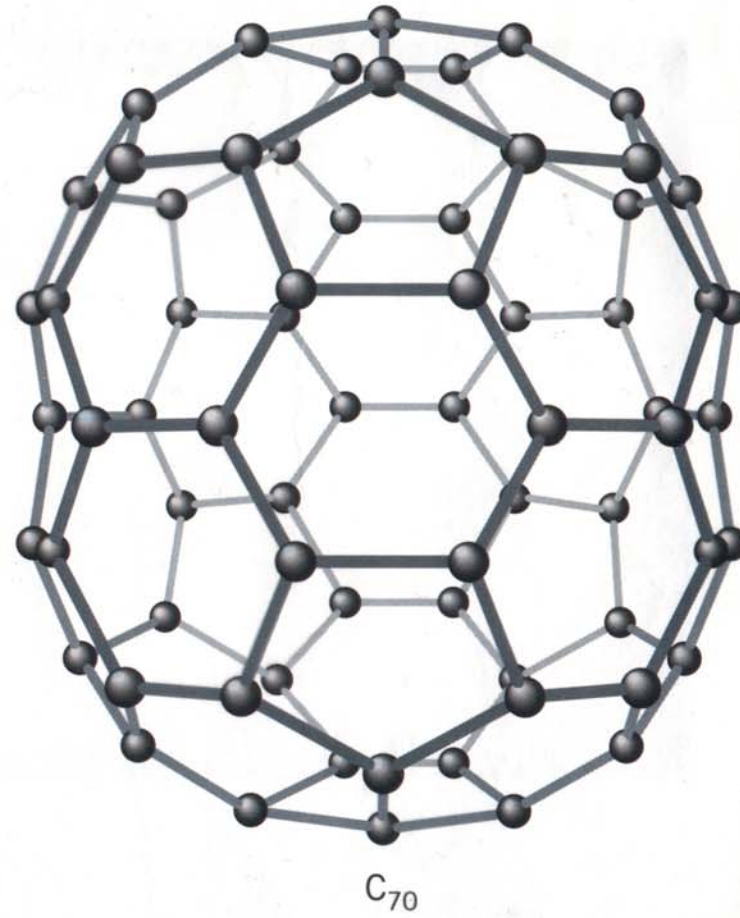
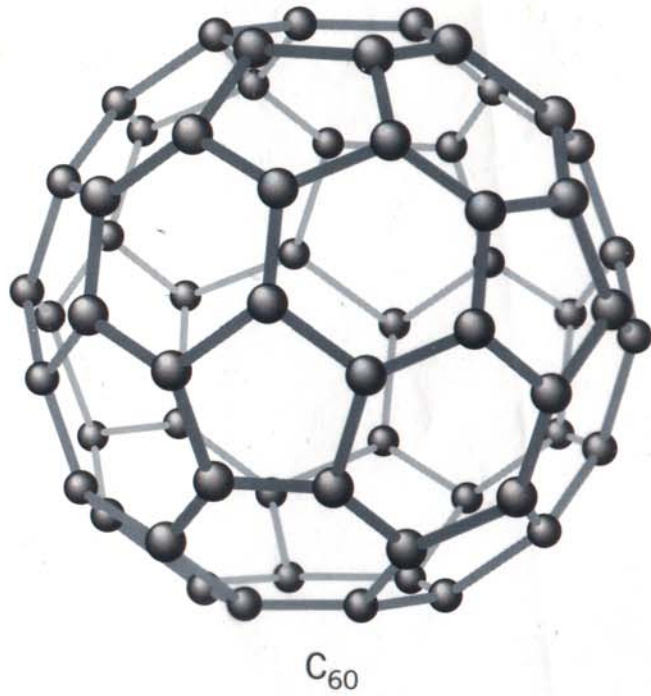


(b)

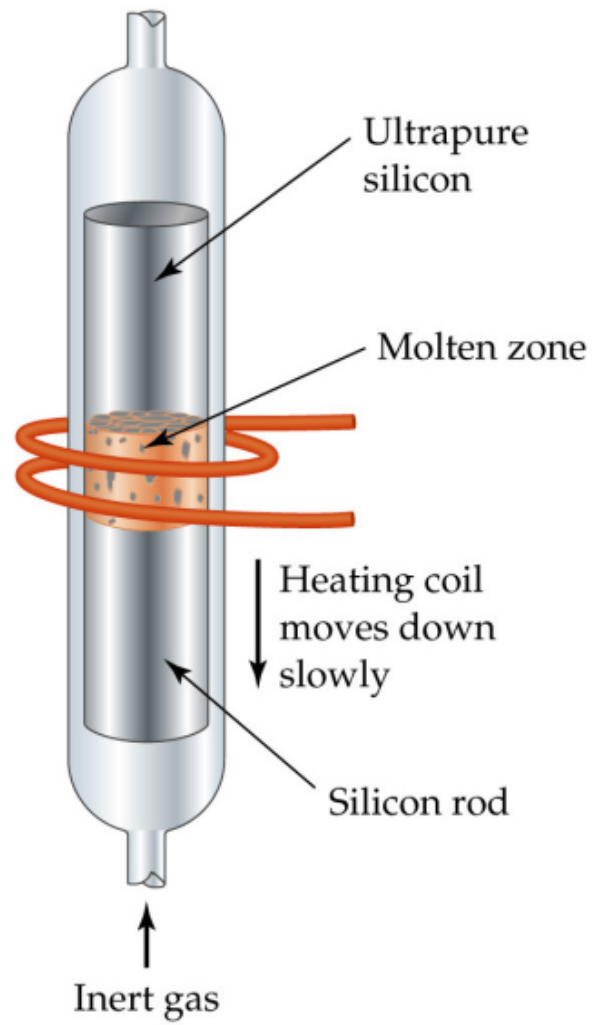
Allotrope des Kohlenstoffs: Graphit und Diamant



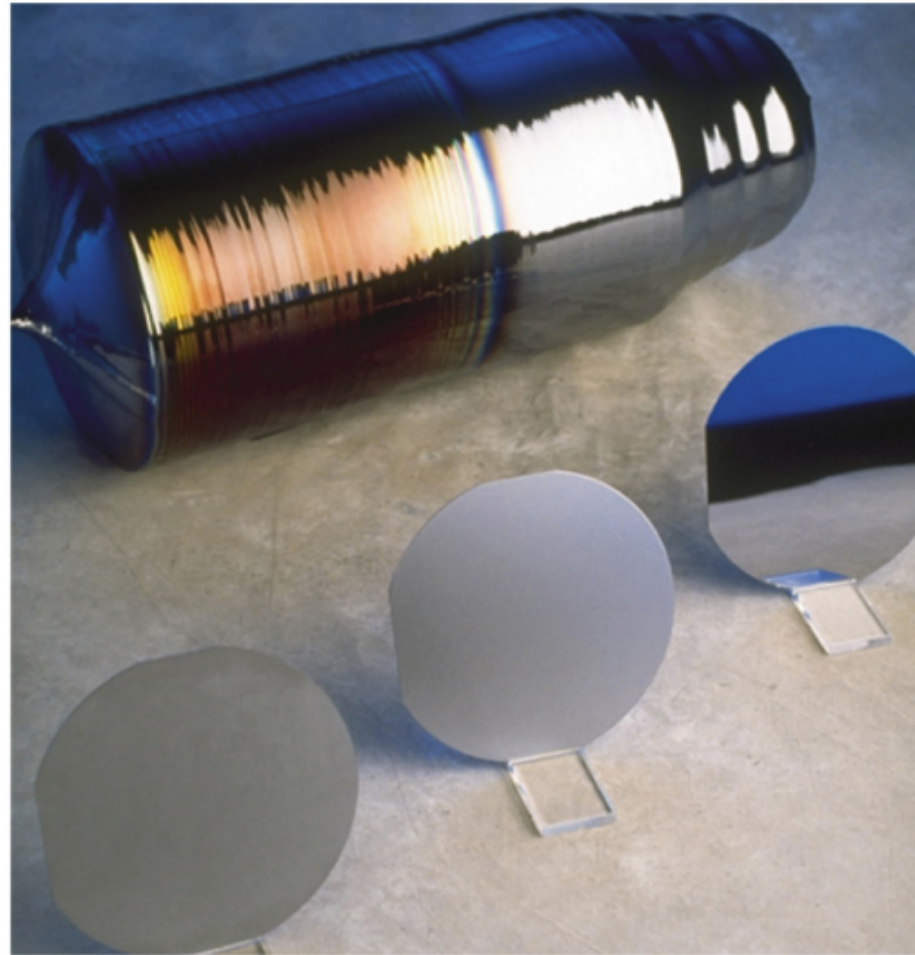
Allotrope des Kohlenstoffs: Fullerene



Herstellung reinen Siliciums durch Zonenschmelzen



(a)



(b)