Which compound has the highest melting point?

1) $CsCl_2$ 2) CaO 3) KBr 4) $MgBr_2$ 5) RbI

Which compound has the highest melting point?

1) CsCl 2) CaO 3) KBr 4) MgBr

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2 +1 -1 +2 -2 +1 -1 +2 -1 +1 -1

Coulombic force $\propto \frac{n^+ \cdot n^-}{d^2}$

What type of orbital has $n = 5$, $l = 1$, $m_l = -1$?

1) 5s 2) 5p 3) 5d 4) 5f 5) none

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1) 5s 2) 5p 3) 5d 4) 5f 5) none

l=0	s
l=1	p
l=2	d
l=3	f

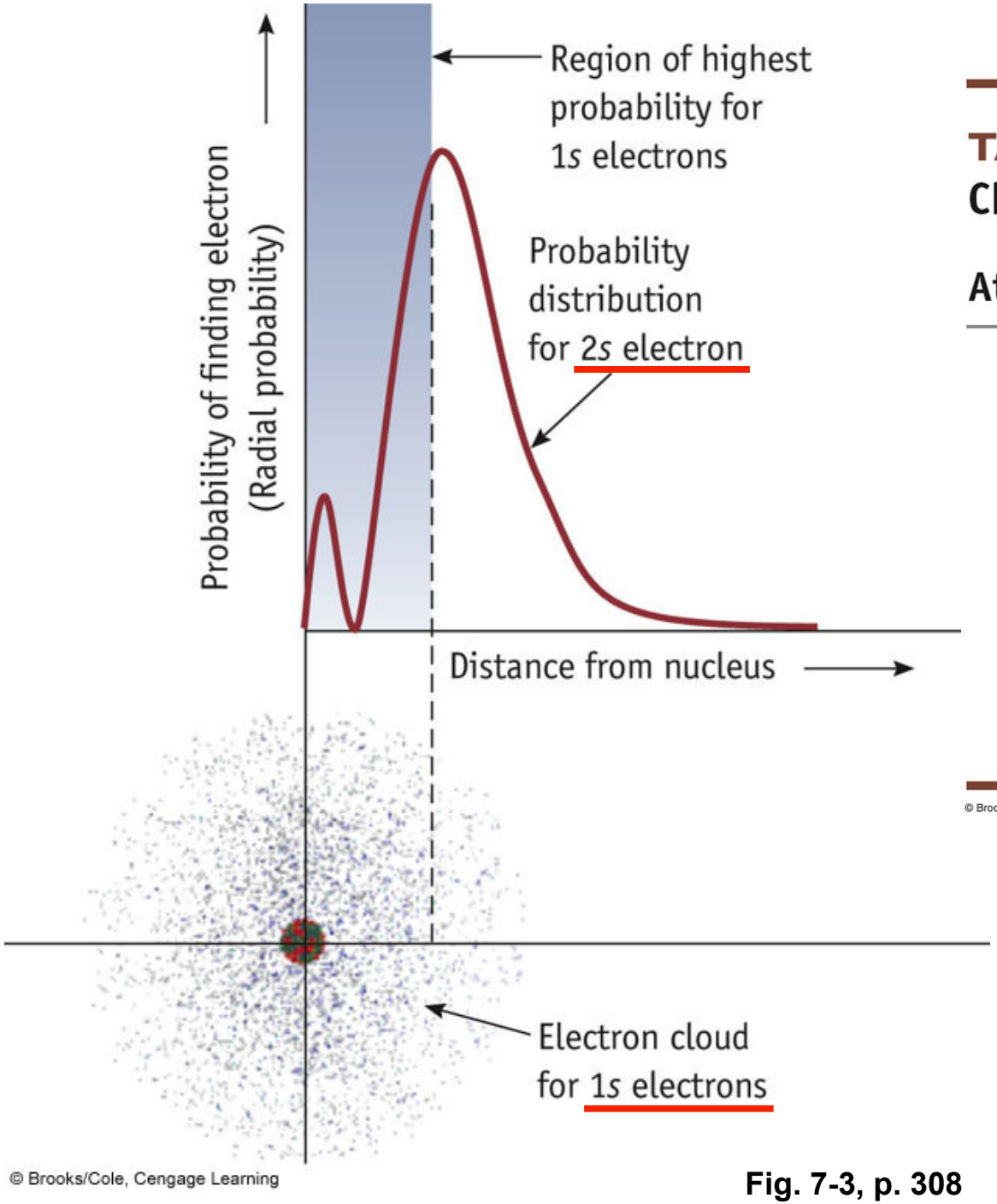

Fig. 7-3, p. 308

TABLE 7.2 Effective Nuclear Charges, Z^*, for $n = 2$ Elements

Atom	$Z^*(2s)$	$Z^*(2p)$
Li	1.28	
B	2.58	2.42
C	3.22	3.14
N	3.85	3.83
O	4.49	4.45
F	5.13	5.10

Table 7-2, p. 309

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Table 7-2, p. 309

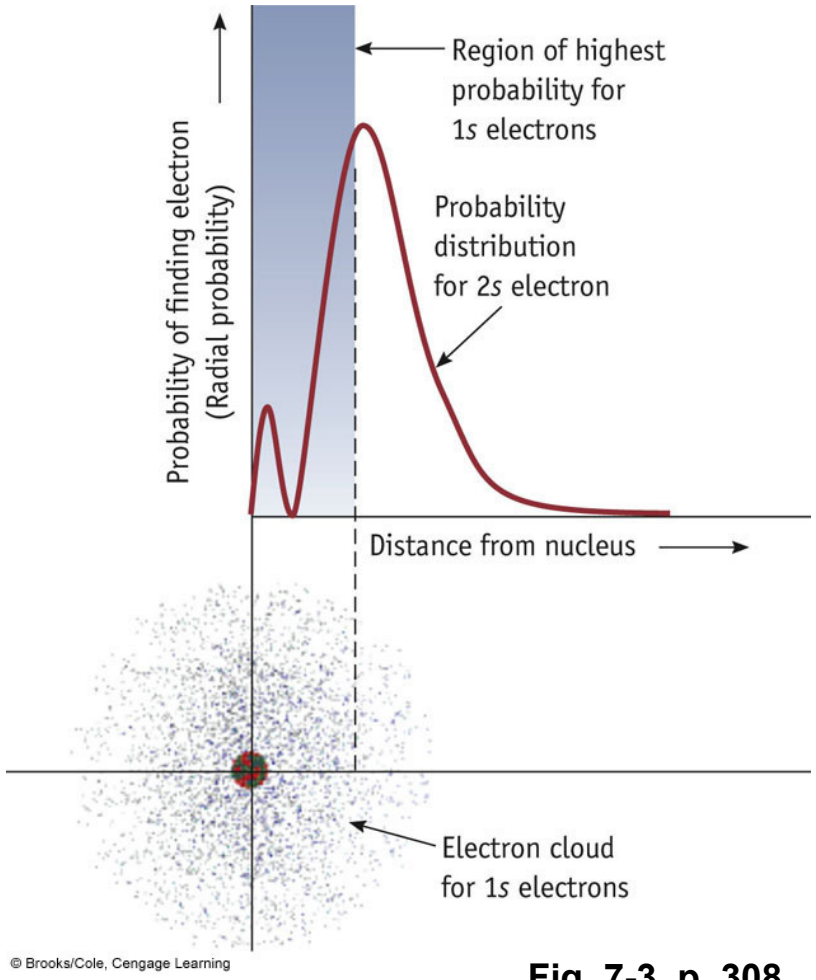
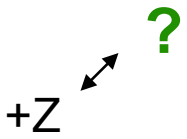
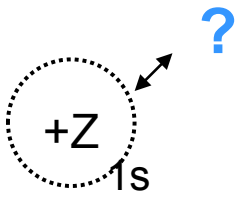


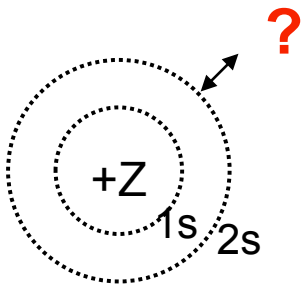
Fig. 7-3, p. 308

Effective Nuclear Charge

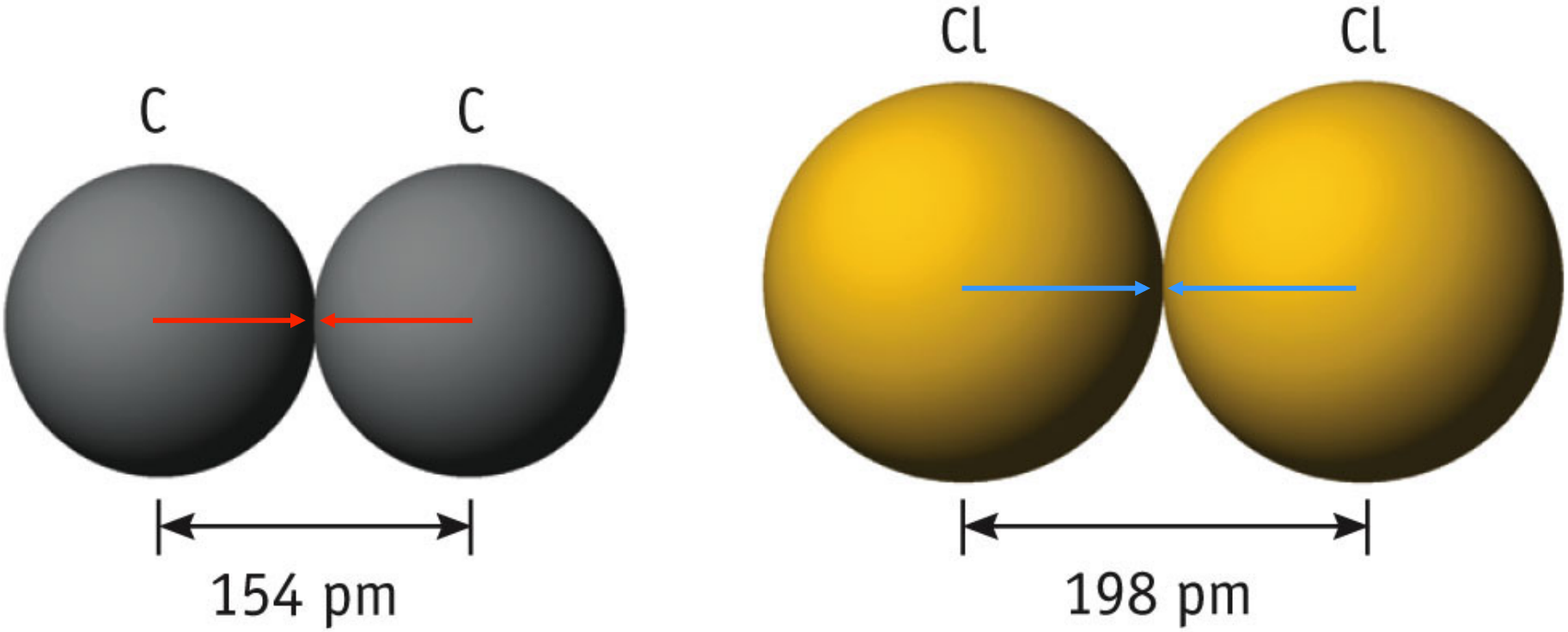
	Z	Z(1s) shielding	Z(1s,2s) shielding	Z* (2s)	Z*(2p)
Li	3	1	-	1.28	-
(Be)	4	2	-	≈2.1	-
B	5	3	1	2.58	2.42
C	6	4	2	3.22	3.14
N	7	5	3	3.85	3.83
O	8	6	4	4.49	4.45
F	9	7	5	5.13	5.10







Size Matters

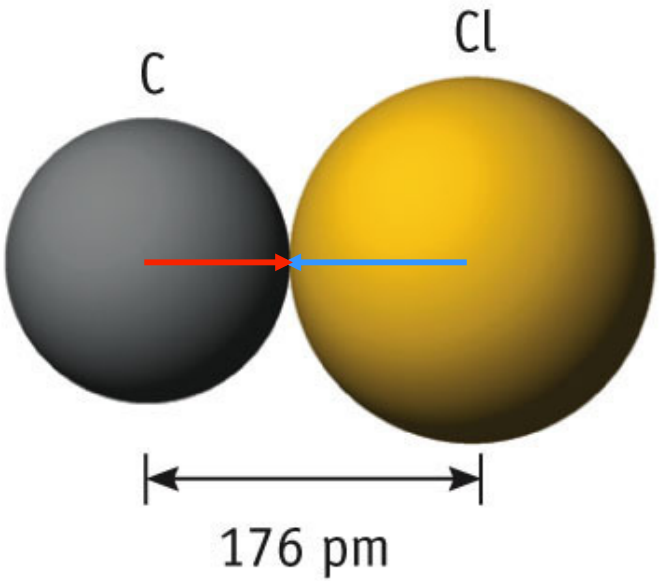


Carbon atomic radius = (154 pm)/2 = 77 pm

Carbon atomic radius = (198 pm)/2 = 99 pm

(a)

Fig. 7-7, p. 319



C-Cl bond distance
= 77 pm + 99 pm = 176 pm

Fig. 7-7, p. 319

TABLE 7.2 Effective Nuclear Charges, Z^*, for $n = 2$ Elements

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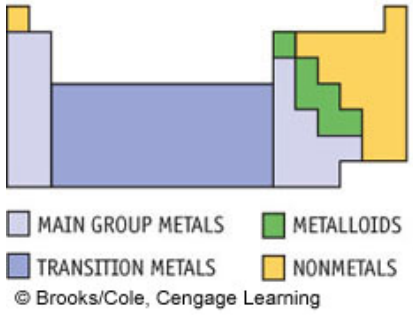
Table 7-2, p. 309



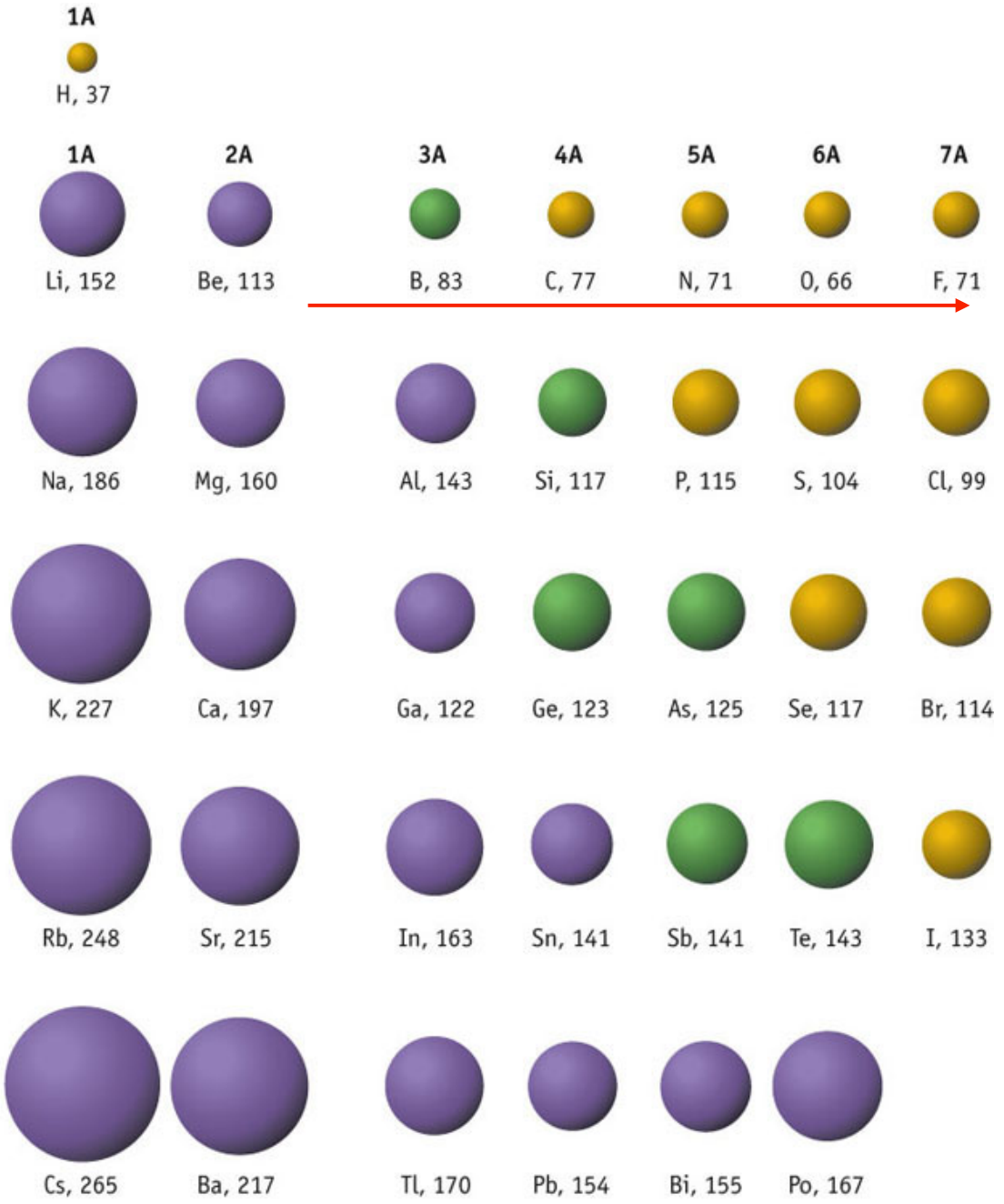


Fig. 7-8, p. 320

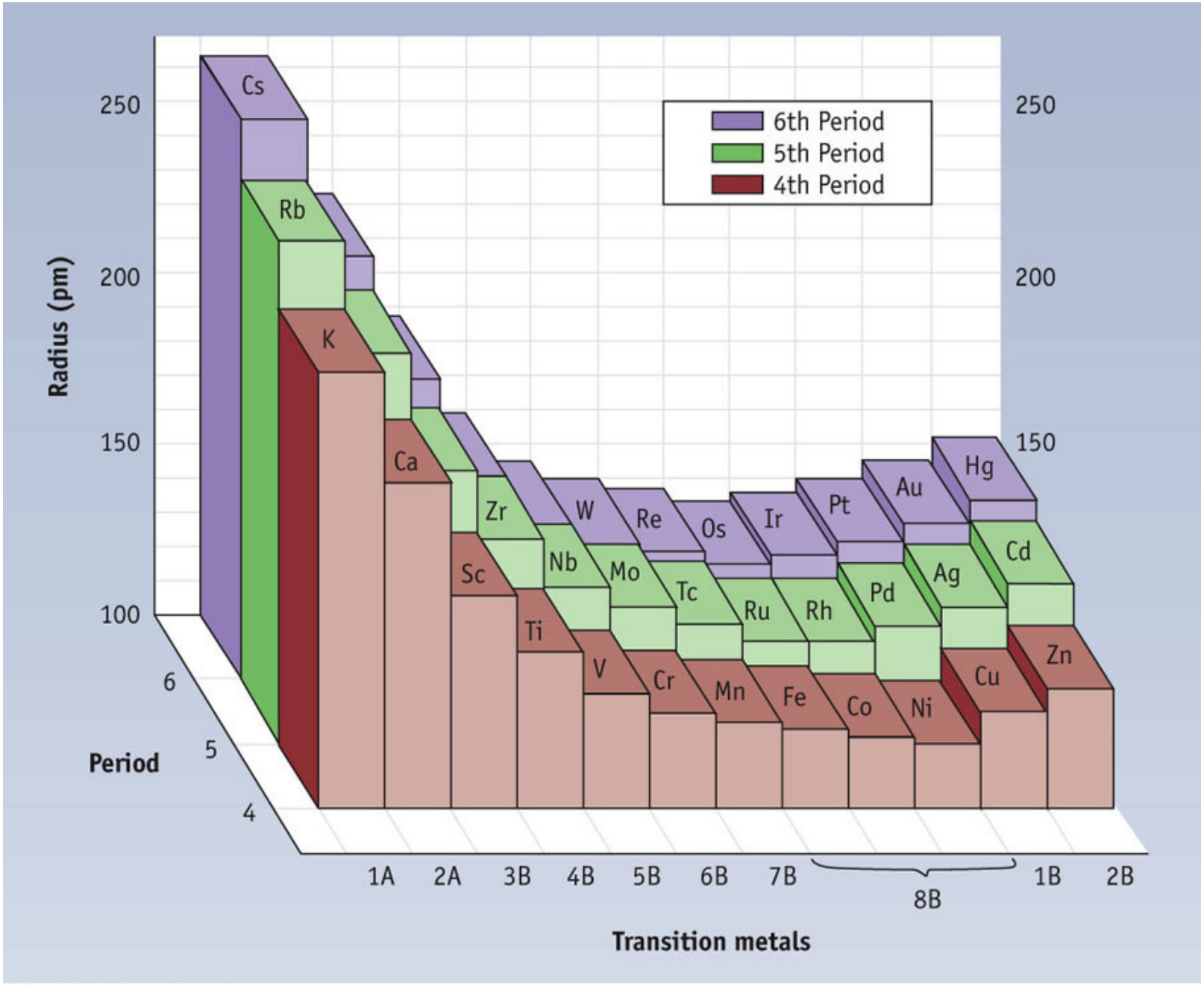
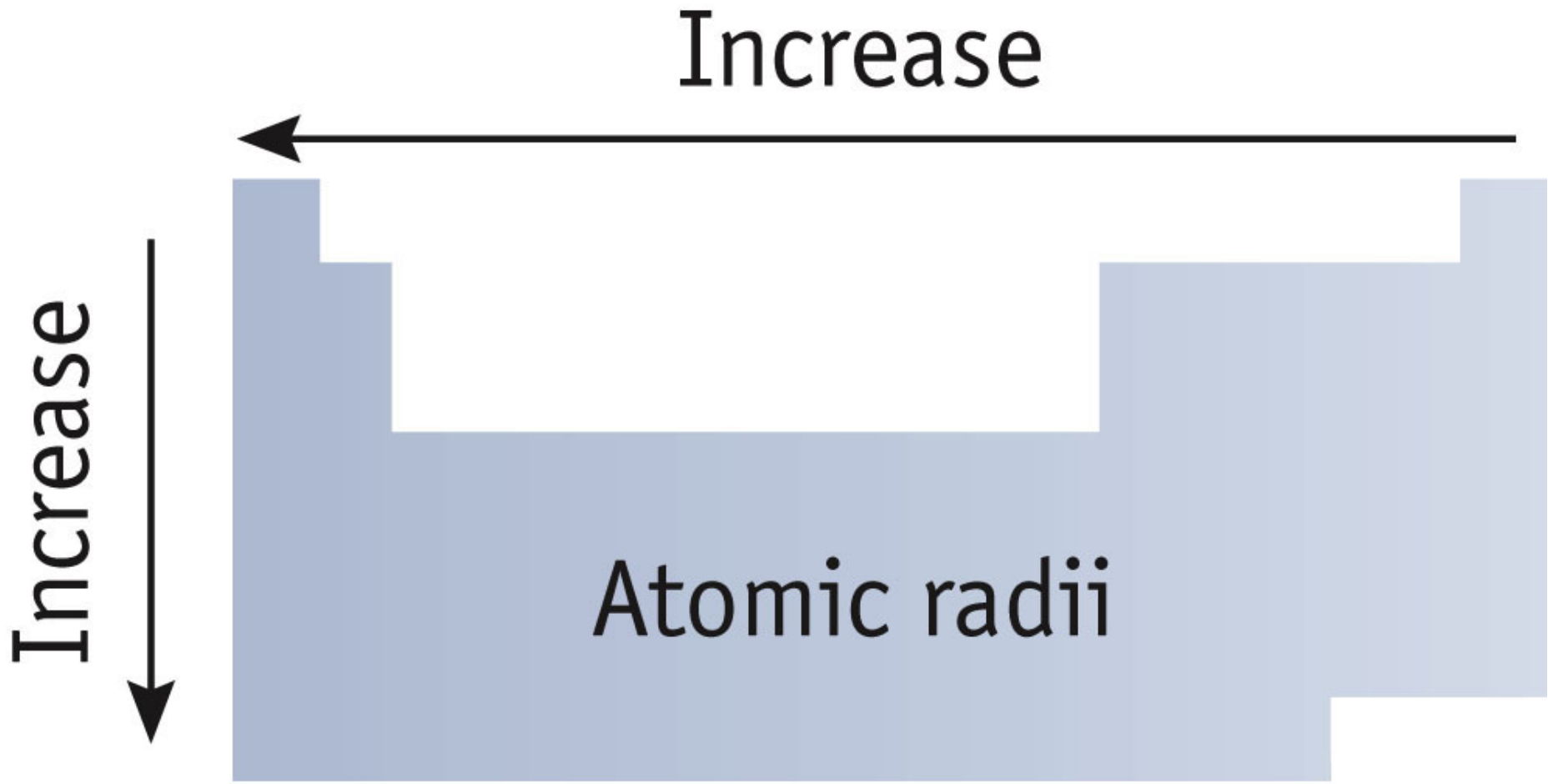


Fig. 7-9, p. 321

Understand WHY!



Ionization Energy

$$X \rightarrow X^{+} + e^{-}$$

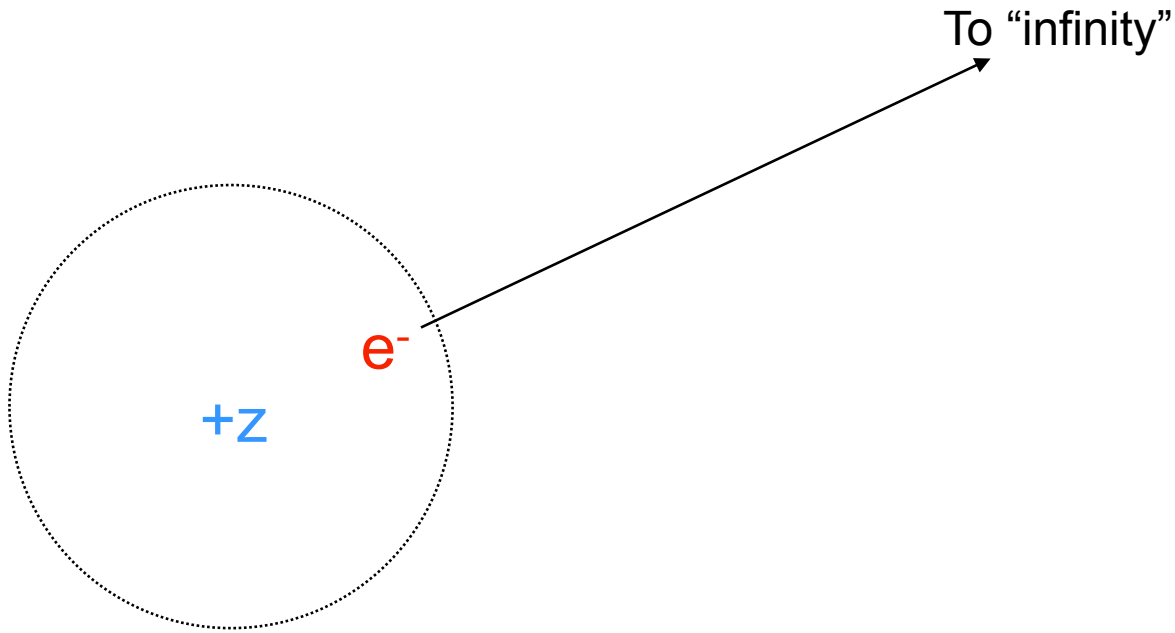
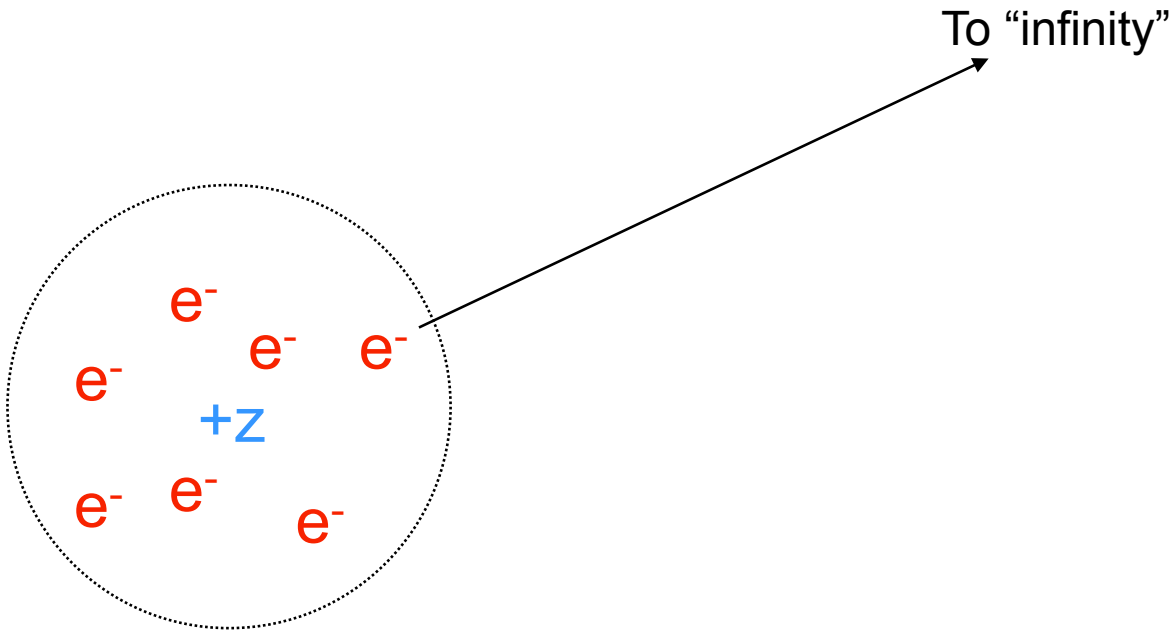


Fig. 7-10, p. 323

Ionization Energy

$$X \rightarrow X^{+} + e^{-}$$



FIRST ionization energy - removing the ‘easiest” electron

Fig. 7-10, p. 323

Ionization Energy

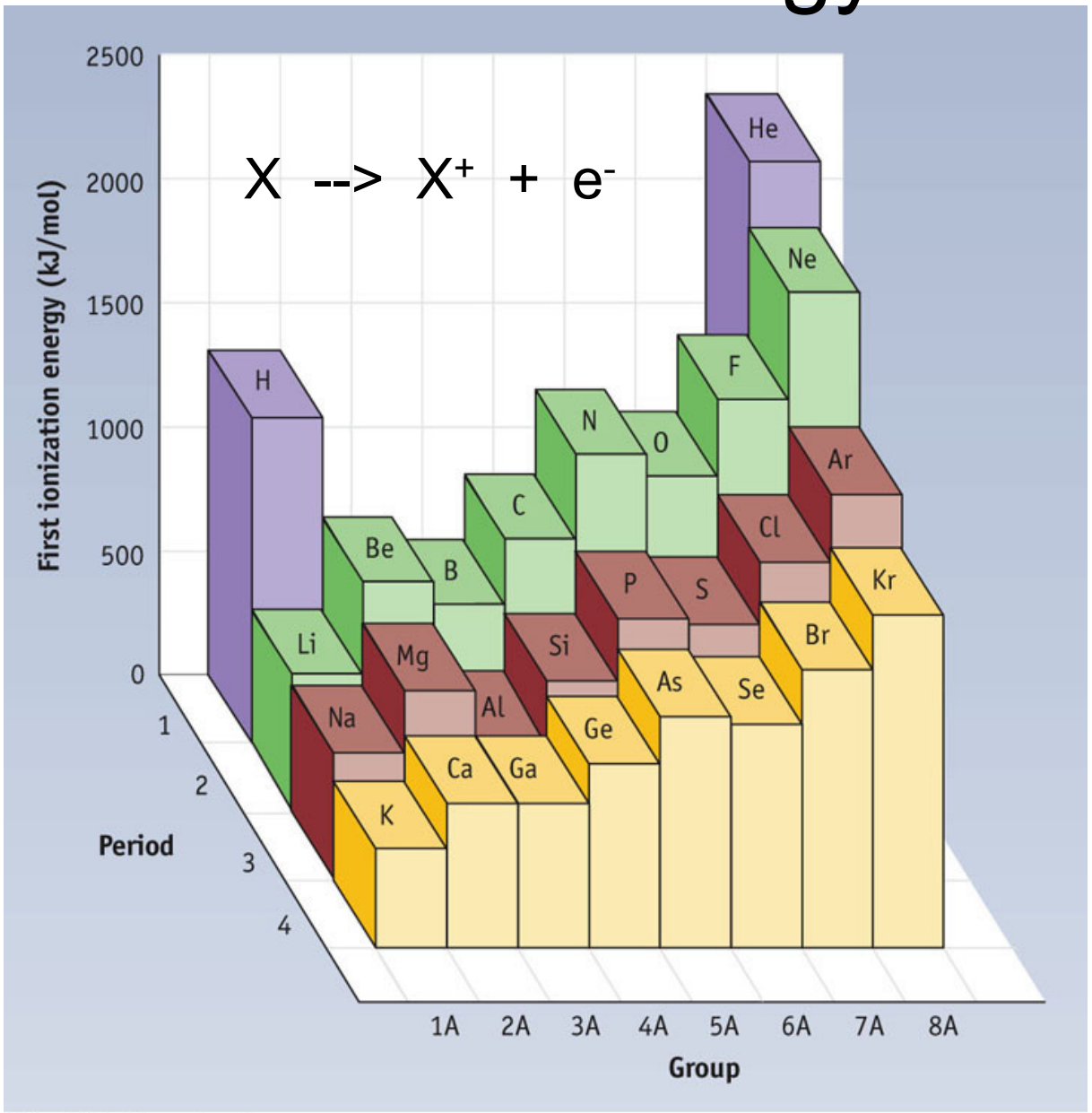
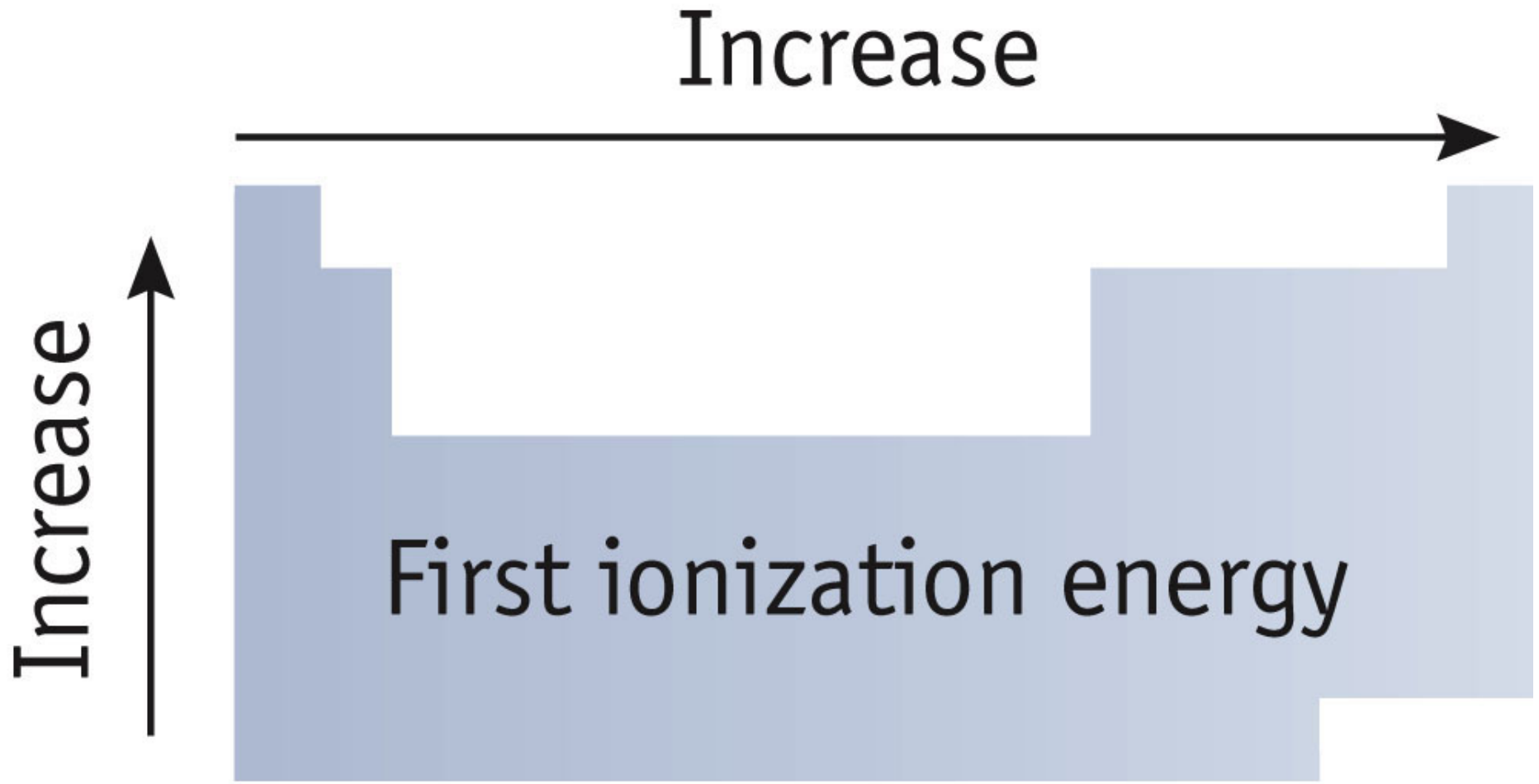
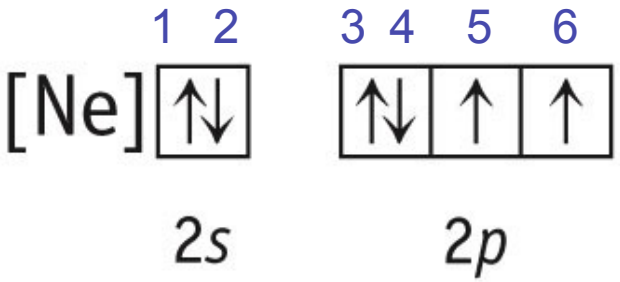


Fig. 7-10, p. 323

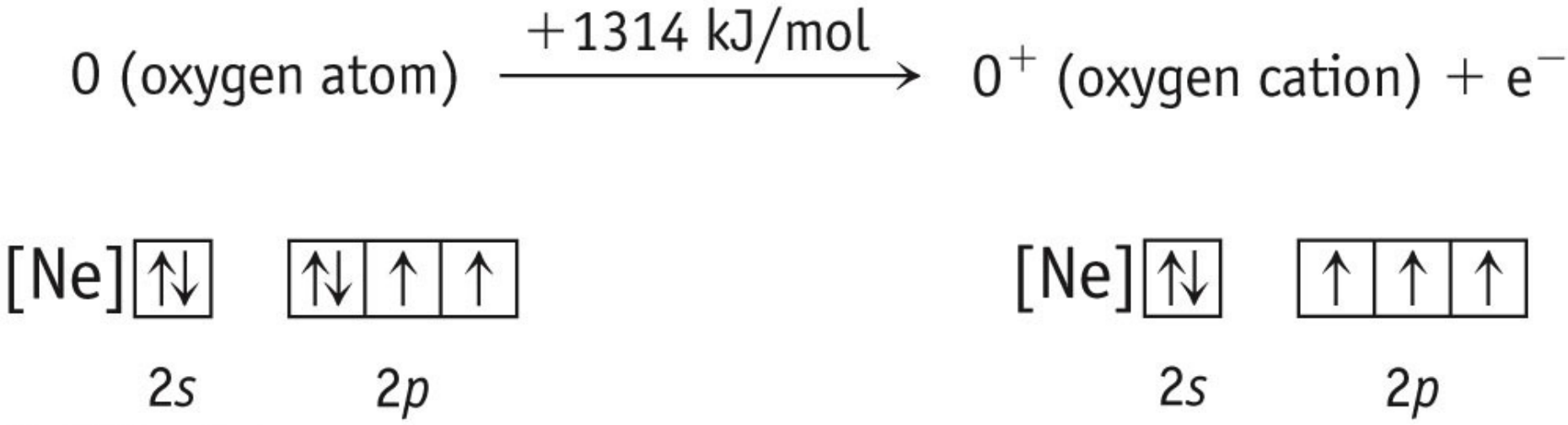


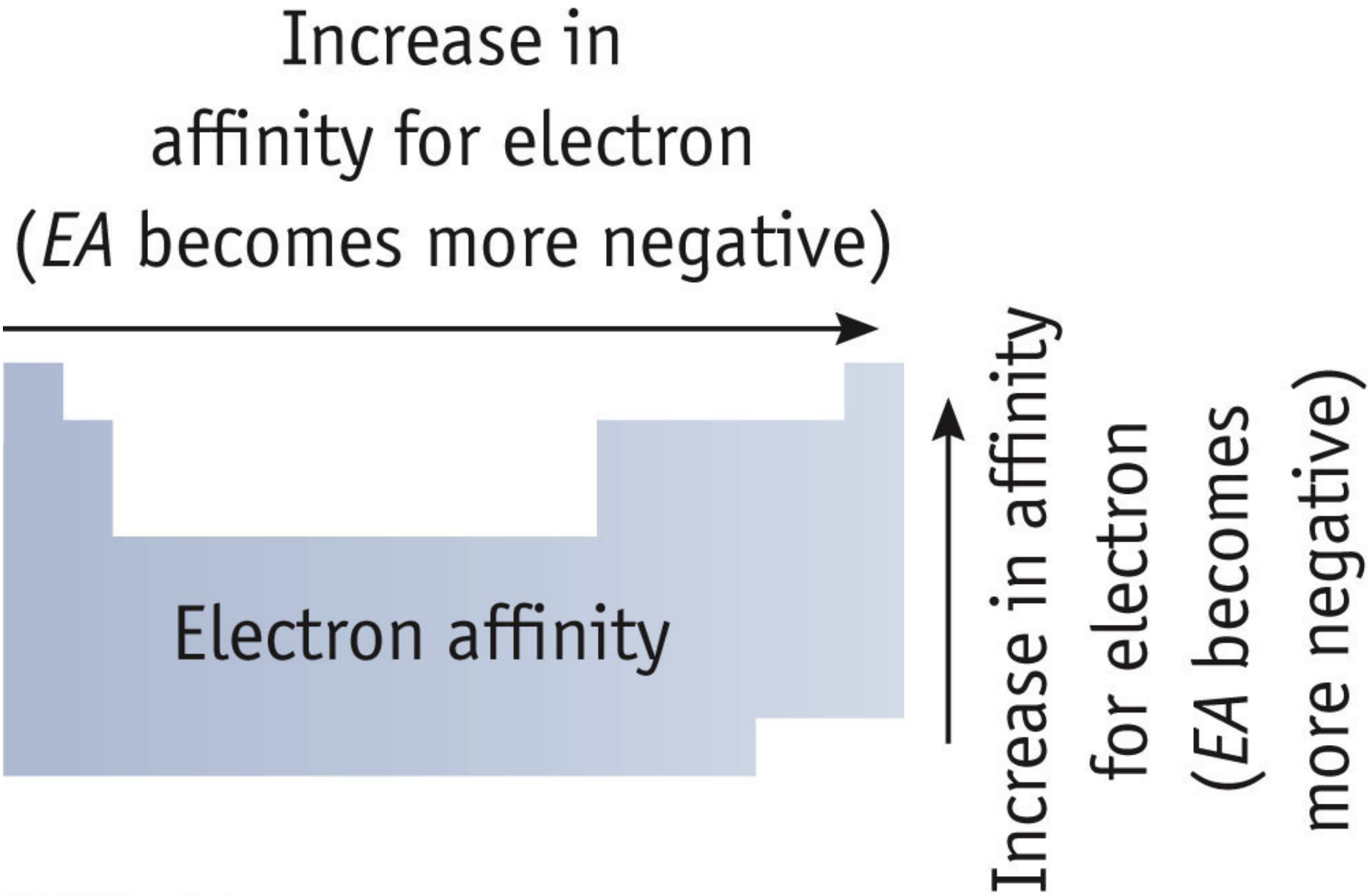
$$\text{O (oxygen atom)} \xrightarrow{+1314\ \text{kJ/mol}} \text{O}^+ \text{ (oxygen cation)} + e^-$$



7 = doesn't matter

Which electron do we remove first?





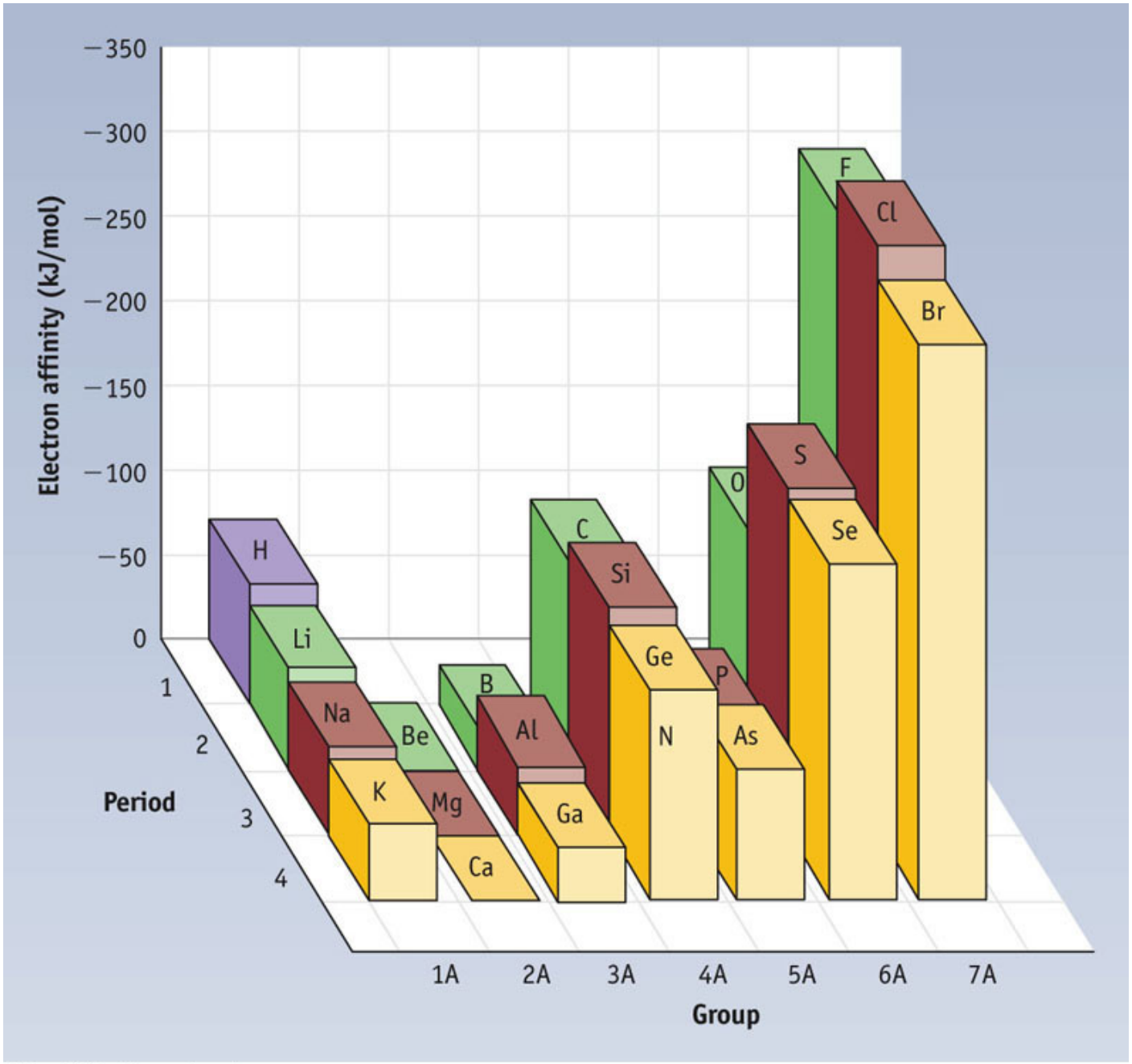


Fig. 7-11, p. 324

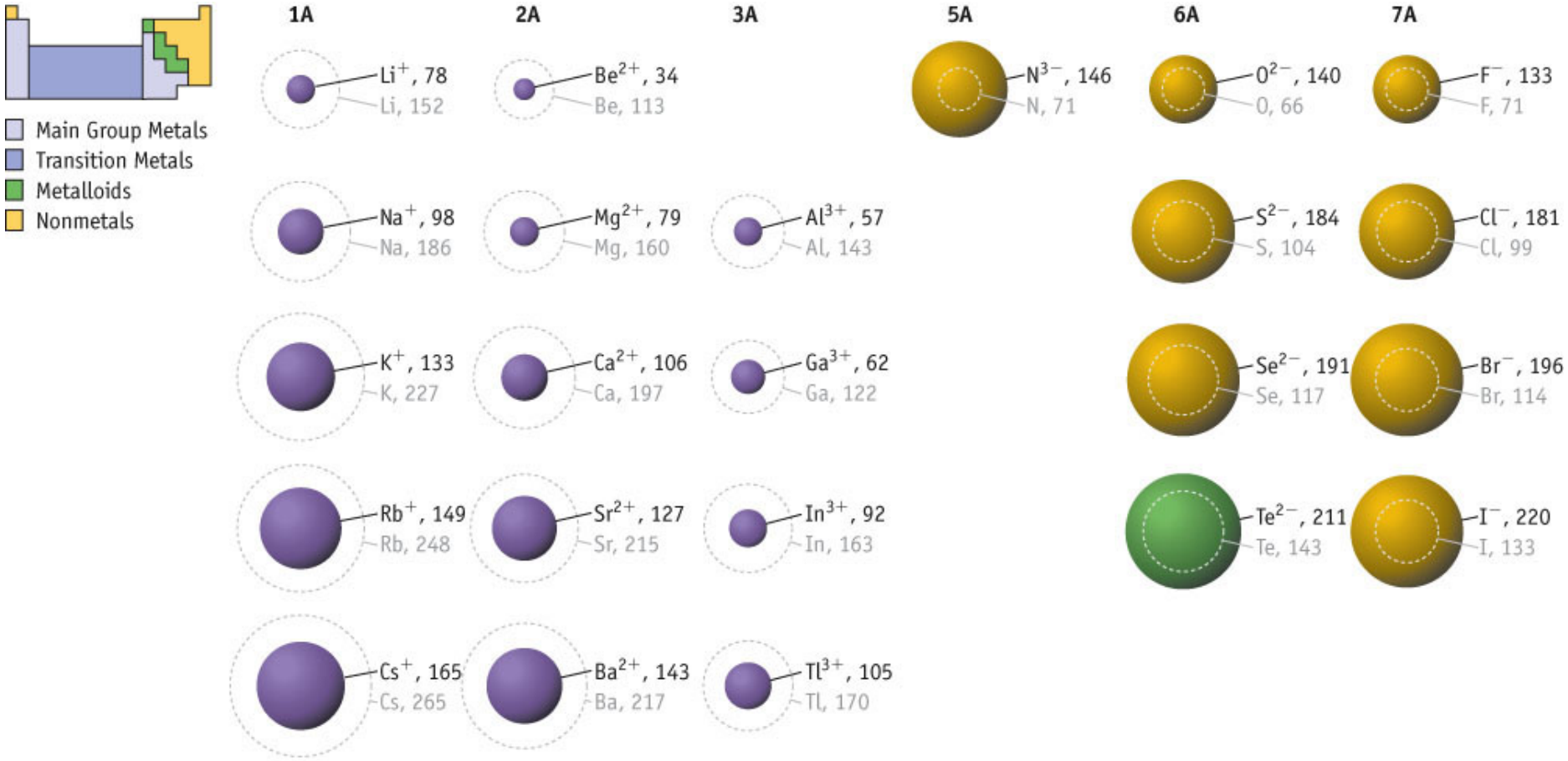
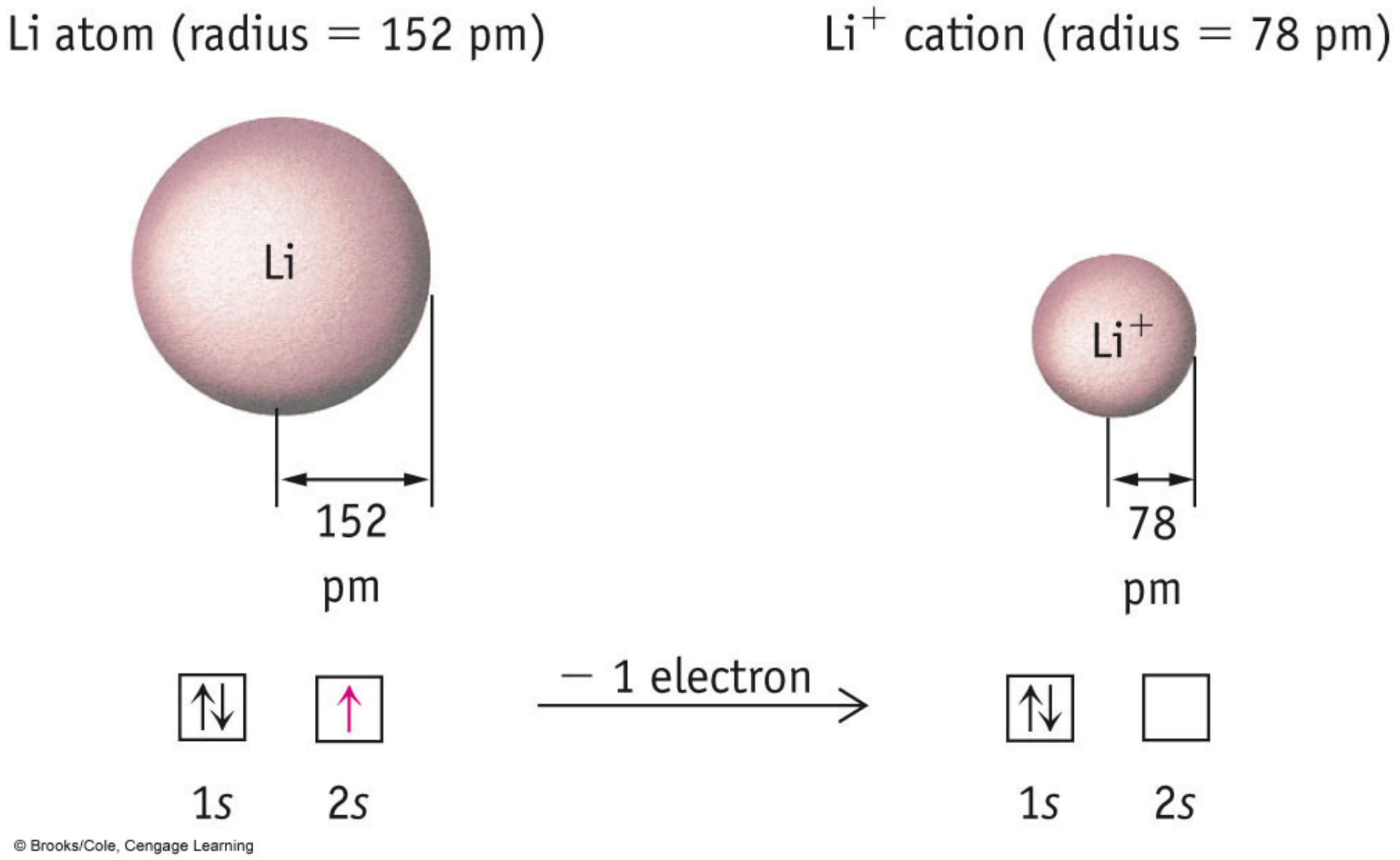
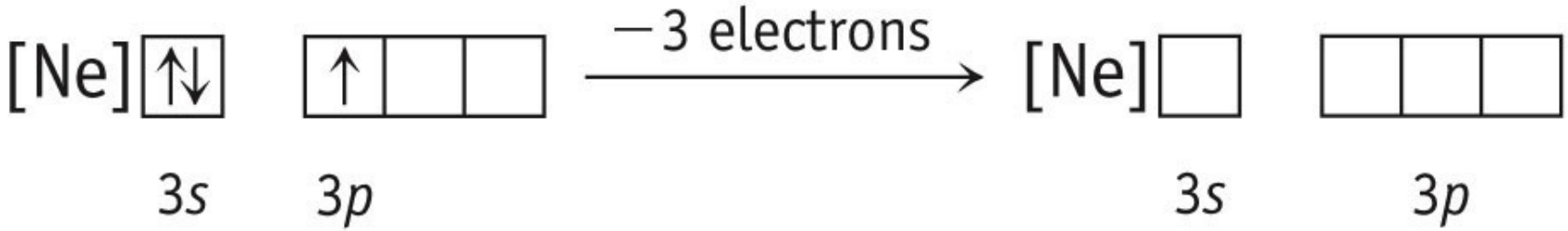


Fig. 7-12, p. 326



Al atom (radius = 143 pm)

Al^{3+} cation (radius = 57 pm)



F atom (radius = 71 pm)

F⁻ anion (radius = 133 pm)