Hányféle kémiai kötést ismerünk?

1
3
5
7
9

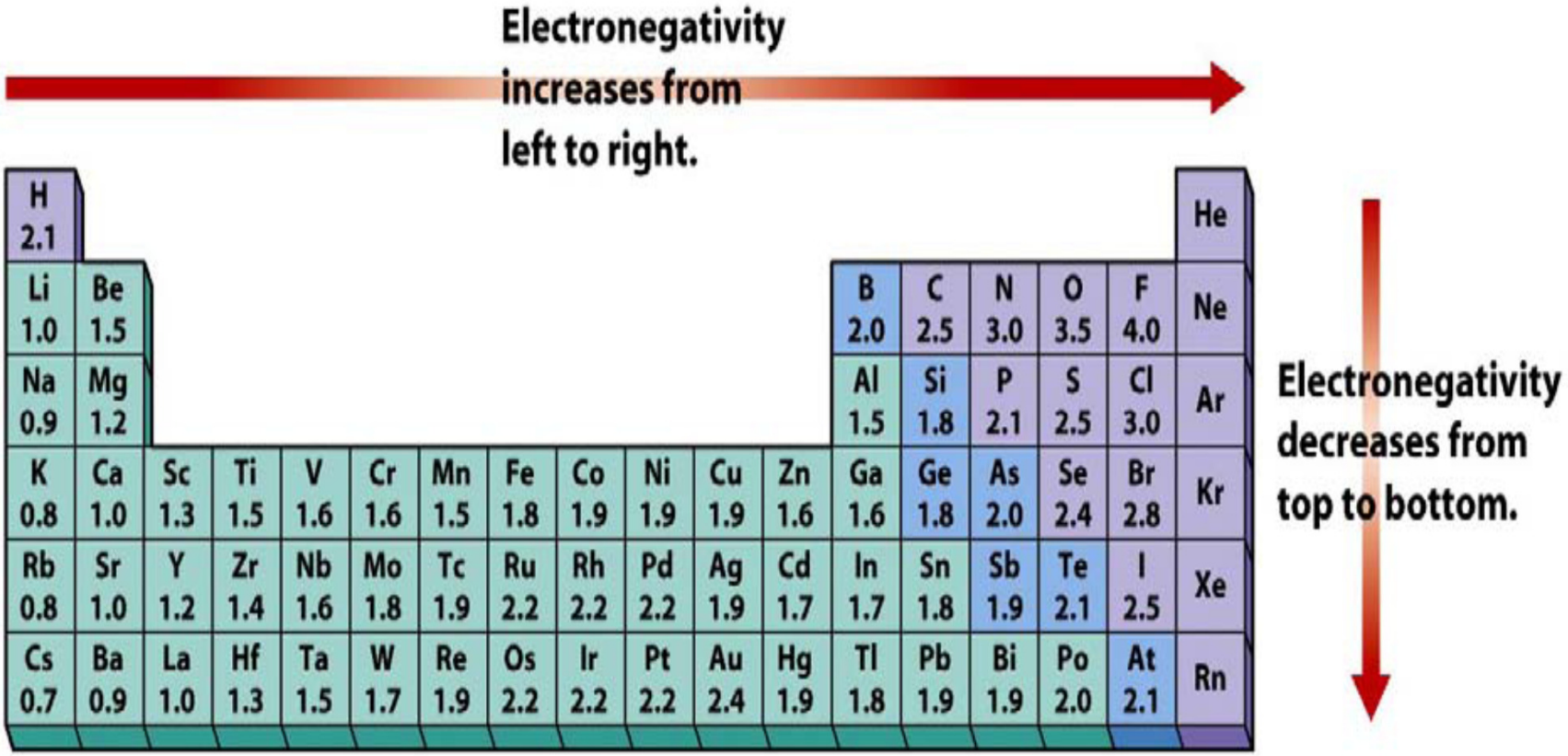
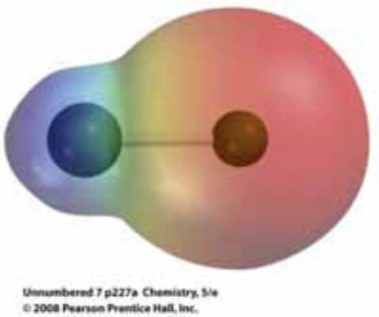


Figure 7-4 Chemistry, 5/e

NaCl



Cl_2

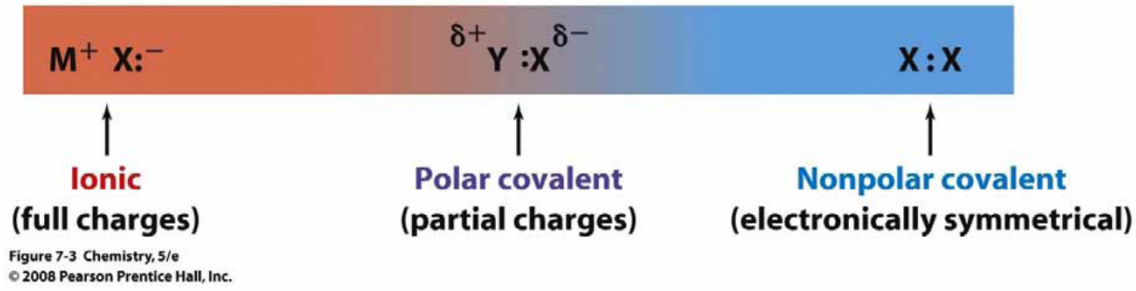


Figure 7-3 Chemistry, 5/e
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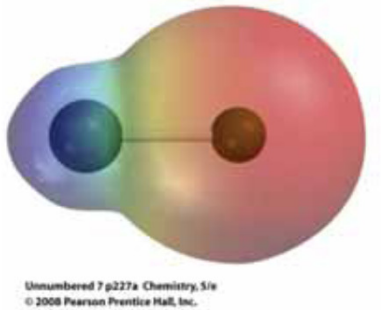
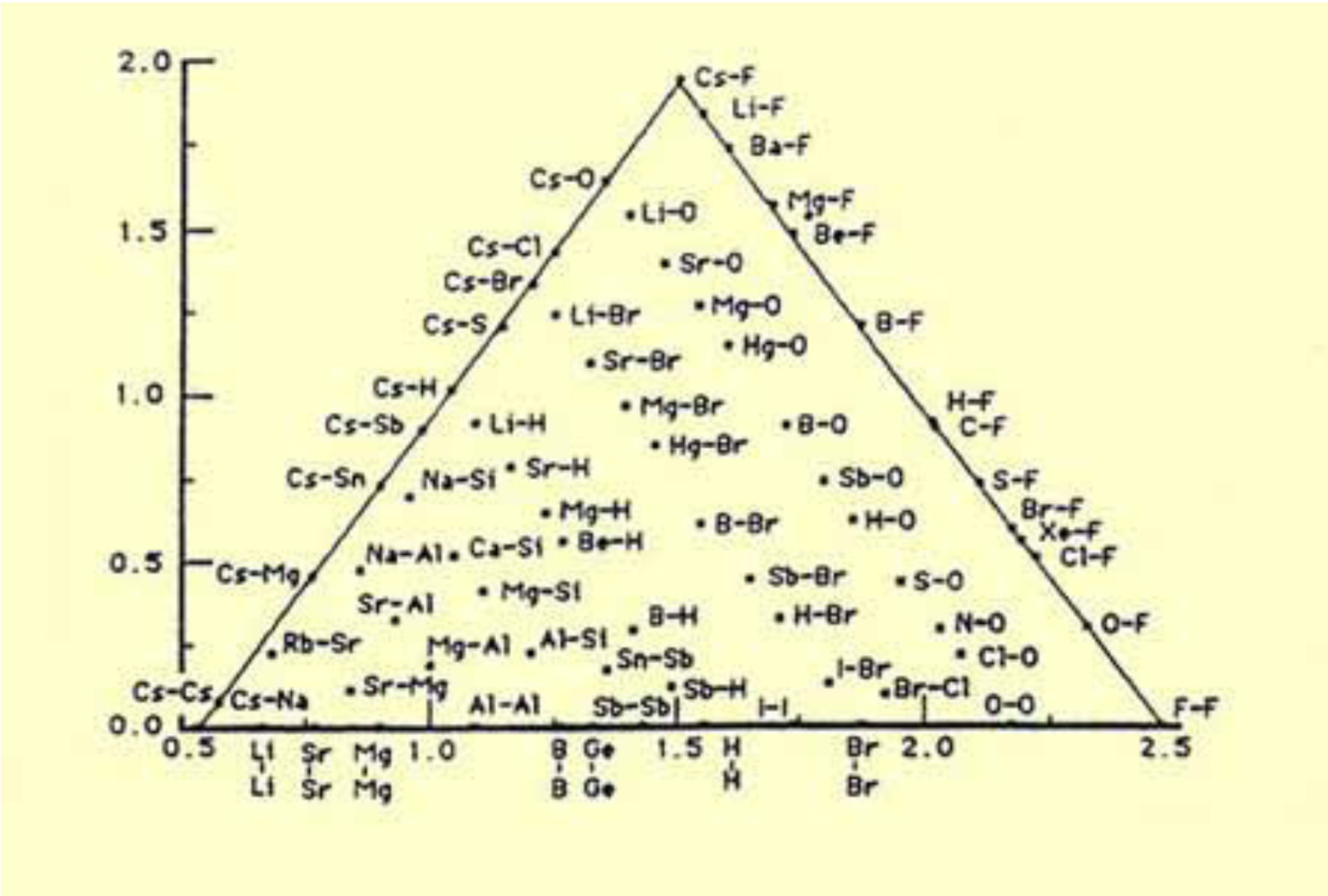


HCl


2.0
1.5
1.0
0.5
0.0
0.5
1.0
1.5
2.0
2.5
Cs-F
Li-F
Ba-F
Mg-F
Be-F
B-F
H-F
C-F
S-F
Br-F
Xe-F
Cl-F
O-F
F-F
Cs-O
Li-O
Sr-O
Mg-O
Hg-O
Cs-Cl
Cs-Br
Cs-S
Li-Br
Sr-Br
Cs-H
Mg-Br
Hg-Br
B-O
Cs-Sb
Li-H
Cs-Sn
Na-Si
Sr-H
Sb-O
Mg-H
B-Br
H-O
Be-H
Na-Al
Ca-Si
Cs-Mg
Sb-Br
S-O
Mg-Si
Sr-Al
B-H
H-Br
N-O
Rb-Sr
Mg-Al
Al-Si
Sn-Sb
Cl-O
I-Br
Cs-Cs
Cs-Na
Sr-Mg
Sb-H
Br-Cl
Al-Al
Sb-Sb
I-I
O-O
Li
Sr
Mg
B
Ge
H
Br
Li
Sr
Mg
B
Ge
H
Br

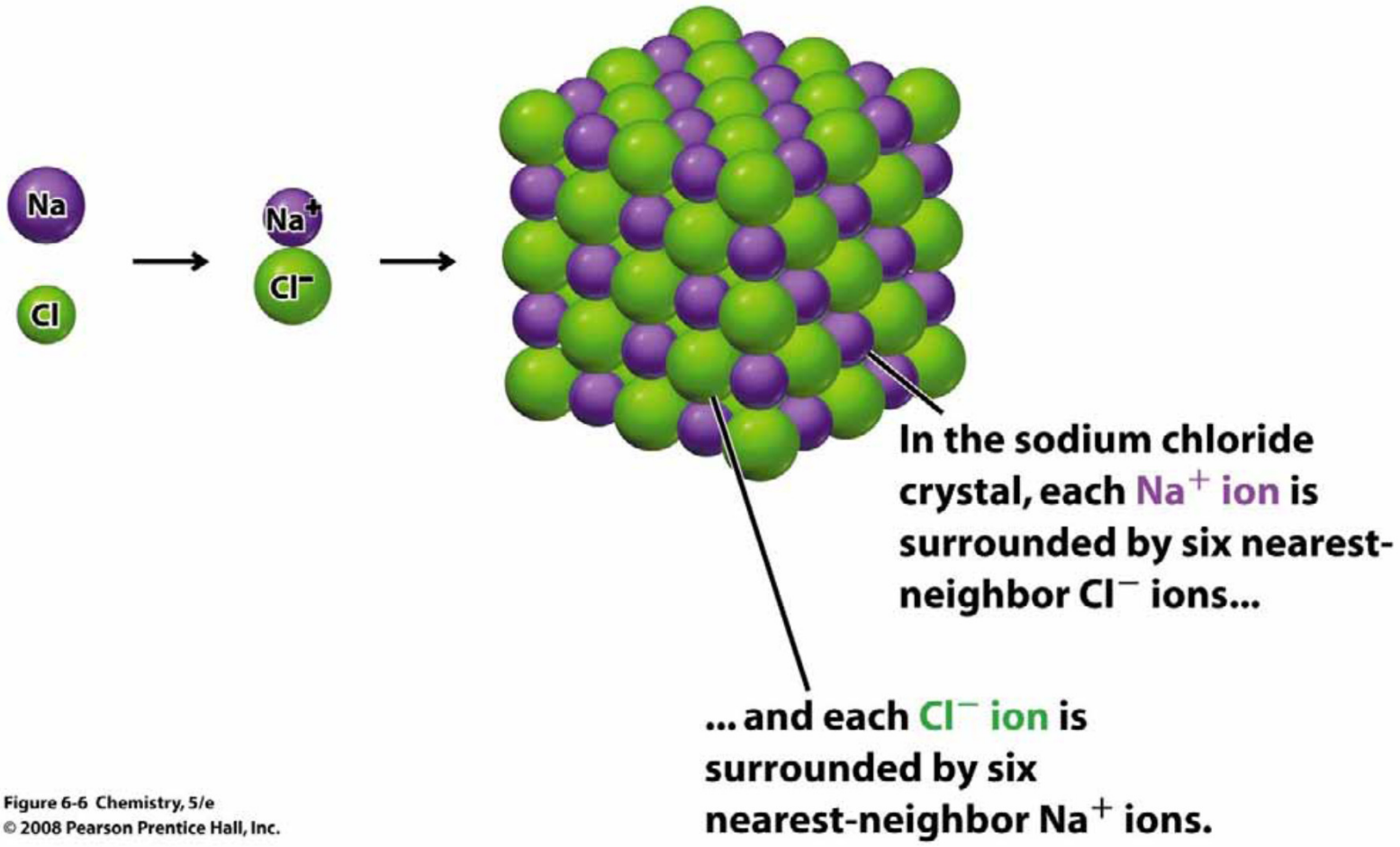
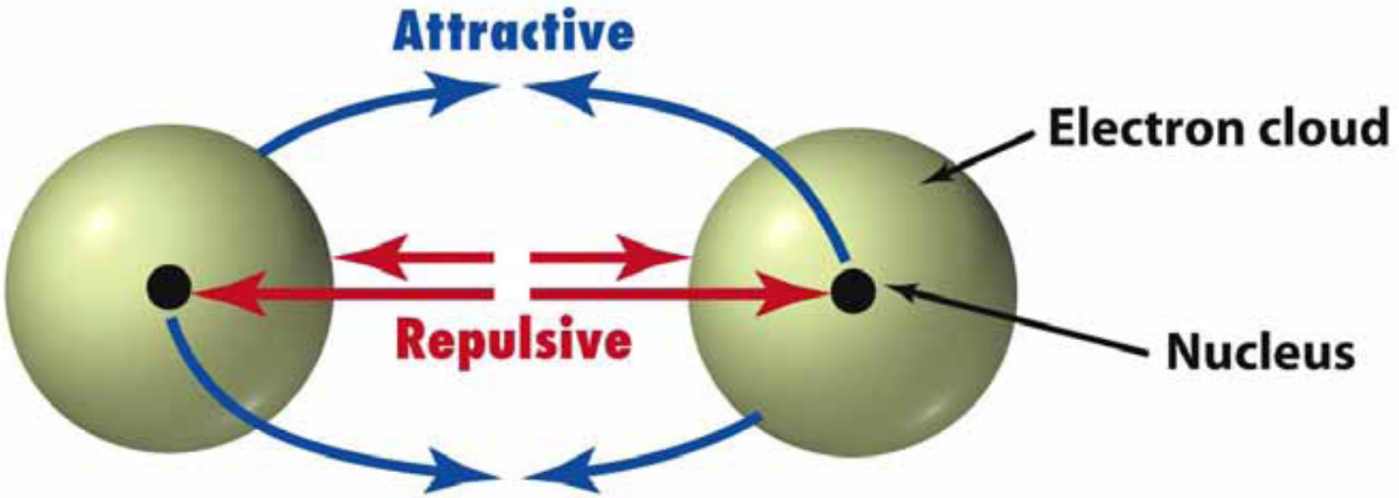


Figure 6-6 Chemistry, 5/e



The nucleus–electron attractions are greater than the nucleus–nucleus and electron–electron repulsions, resulting in a net attractive force that binds the atoms together.

Figure 7-1 Chemistry, 5/e

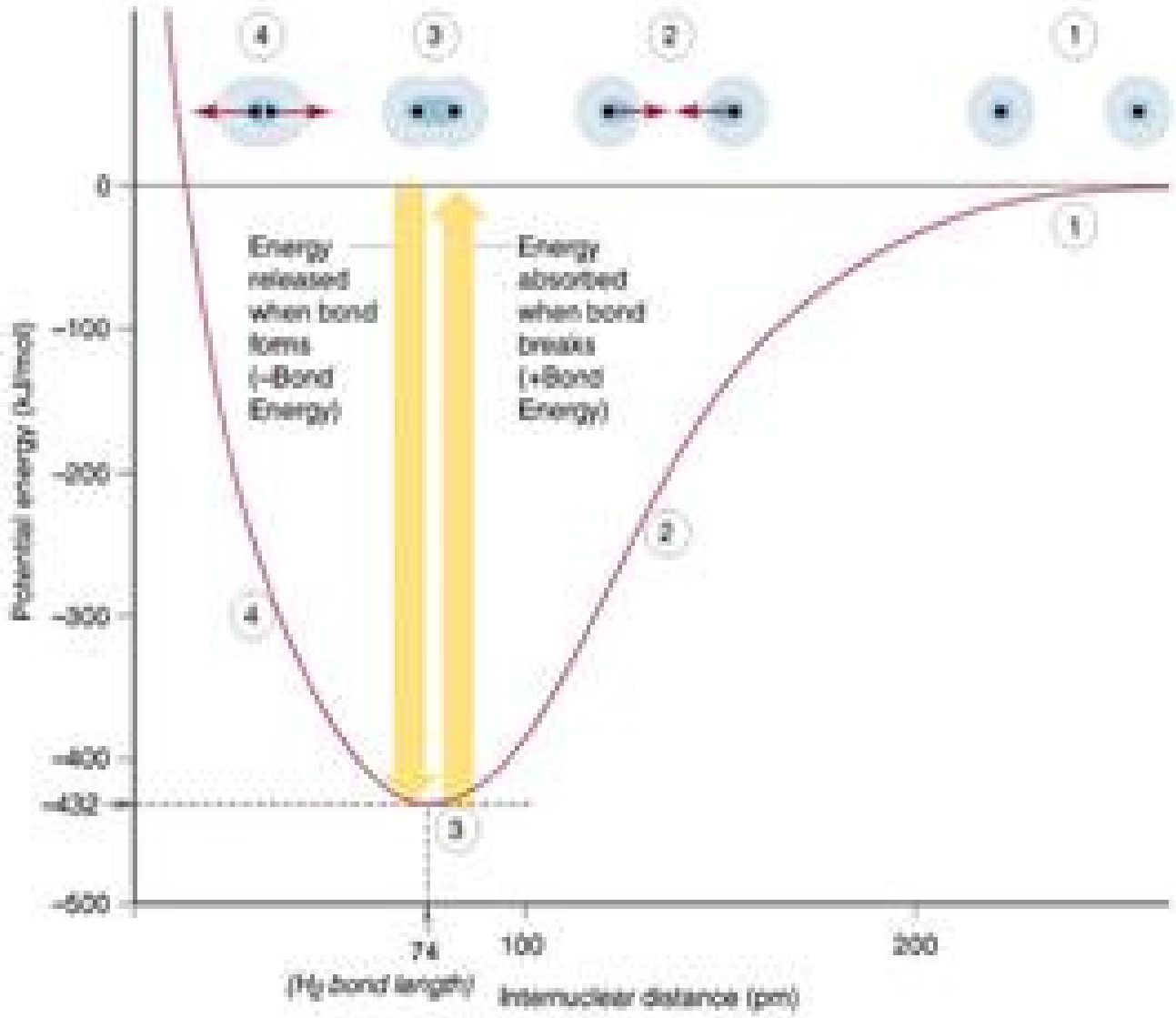

4
3
2
1
0
−100
−200
−300
−400
−432
−500
Potential energy (kJ/mol)
Energy released when bond forms (−Bond Energy)
Energy absorbed when bond breaks (+Bond Energy)
74
(H2 bond length)
100
200
Internuclear distance (pm)

TABLE 7.1 Average Bond Dissociation Energies, *D* (kJ/mol)

H–H	436[a]	C–H	410	N–H	390	O–H	460	F–F	159[a]
H–C	410	C–C	350	N–C	300	O–C	350	Cl–Cl	243[a]
H–F	570[a]	C–F	450	N–F	270	O–F	180	Br–Br	193[a]
H–Cl	432[a]	C–Cl	330	N–Cl	200	O–Cl	200	I–I	151[a]
H–Br	366[a]	C–Br	270	N–Br	240	O–Br	210	S–F	310
H–I	298[a]	C–I	240	N–I	—	O–I	220	S–Cl	250
H–N	390	C–N	300	N–N	240	O–N	200	S–Br	210
H–O	460	C–O	350	N–O	200	O–O	180	S–S	225
H–S	340	C–S	260	N–S	—	O–S	—		
Multiple covalent bonds[b]									
C=C	611	C≡C	835	C=O	732	O=O	498[a]	N≡N	945[a]

[a] Exact value

[b] We'll discuss multiple covalent bonds in Section 7.5.

Table 7-1 Chemistry, 5/e

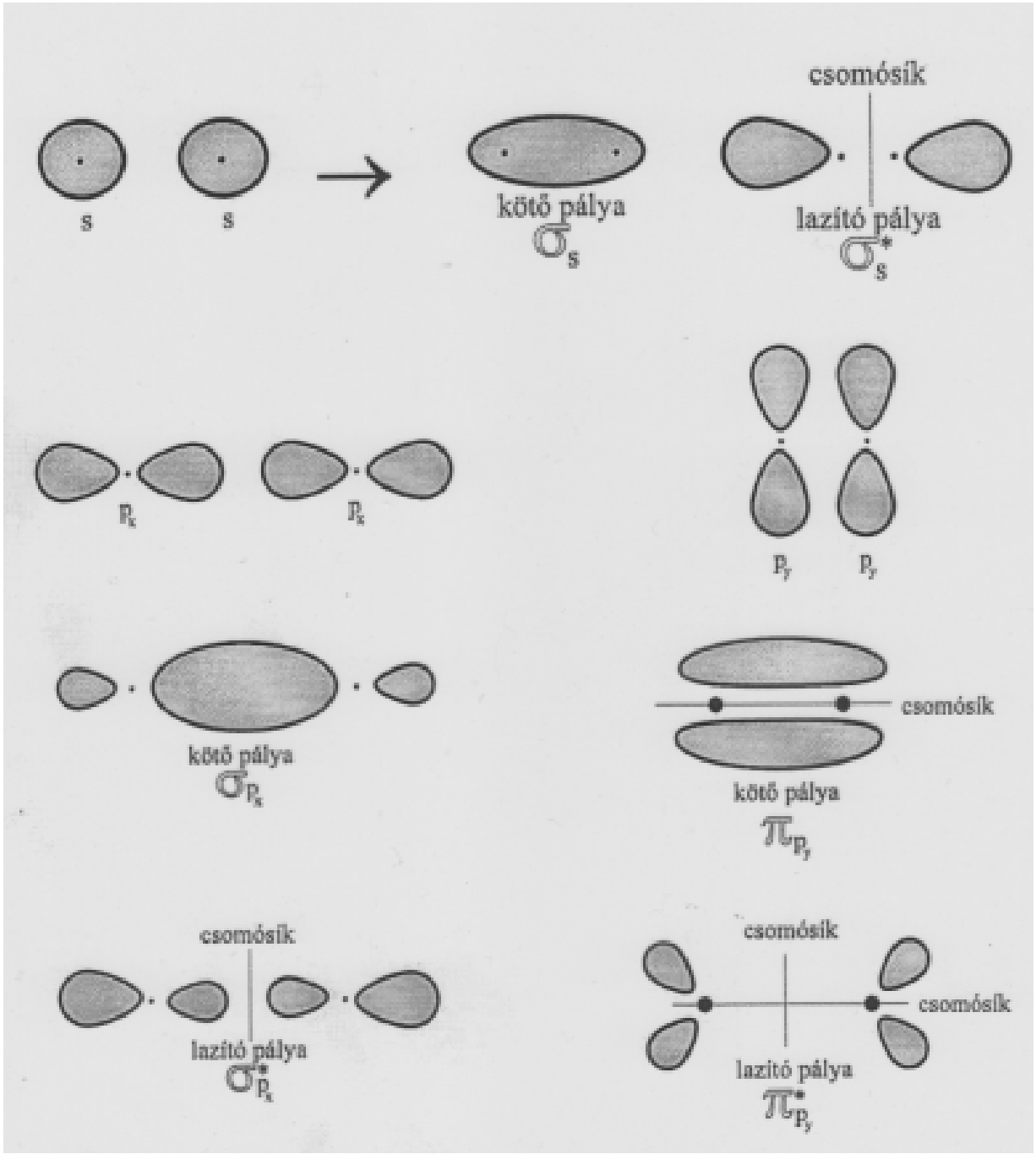
A kötéshosszak és erősségek változása C_2H_x molekulák esetén

	etán	etén	etin
kötés típusa:	egyszeres	kétszeres	háromszoros
kötéshossz:	154 pm	134 pm	120 pm
kötés erősség:	348 kJ/mol	614 kJ/mol	839 kJ/mol

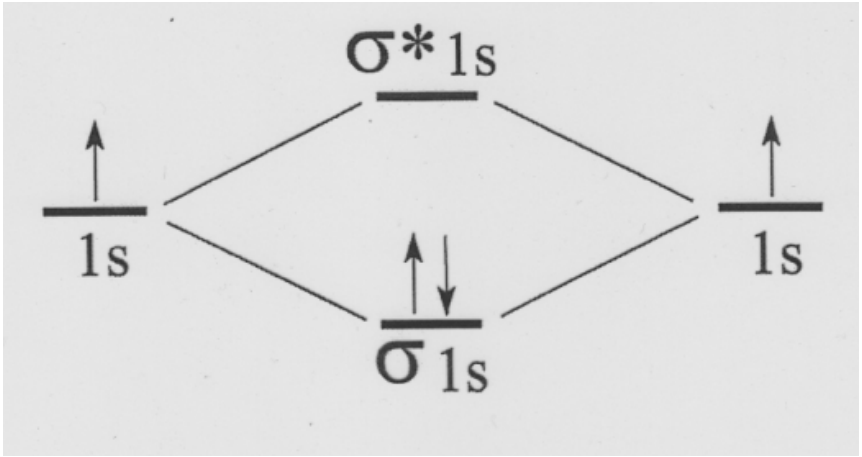
Többszörös kötés:

- nagyobb kötéserősség, de nem pontosan 2-szer, 3-szor.
- rövidebb kötéshossz, de jelentősen kisebb a hatás.

	ΔEN	Polaritás
H_2	0	apoláris
HI	~0,5	gyengén poláris
HBr	~0,7	poláris
HCl	~0,9	erősen poláris
HF	~1,9	igen erősen poláris
NaCl	~2,1	ionos

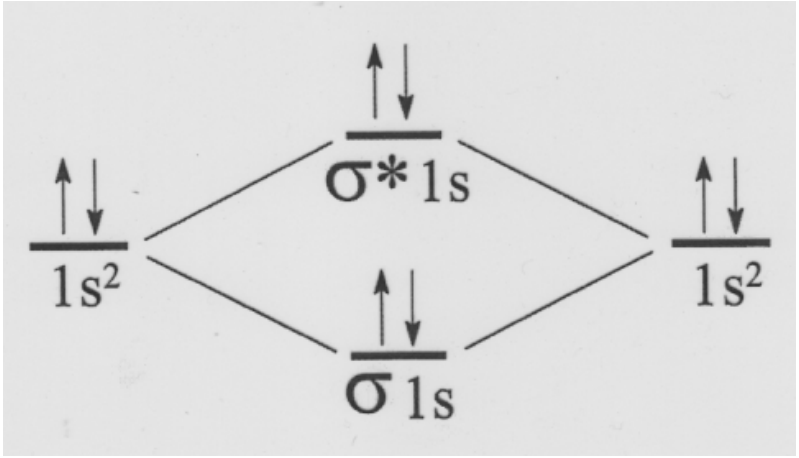

s
s
kötő pálya
σ_s
csomósík
lazító pálya
σ^*_s
p_x
p_x
p_y
p_y
kötő pálya
σ_{p_x}
csomósík
kötő pálya
π_{p_y}
csomósík
lazító pálya
$\sigma^*_{p_x}$
csomósík
csomósík
lazító pálya
$\pi^*_{p_y}$

H

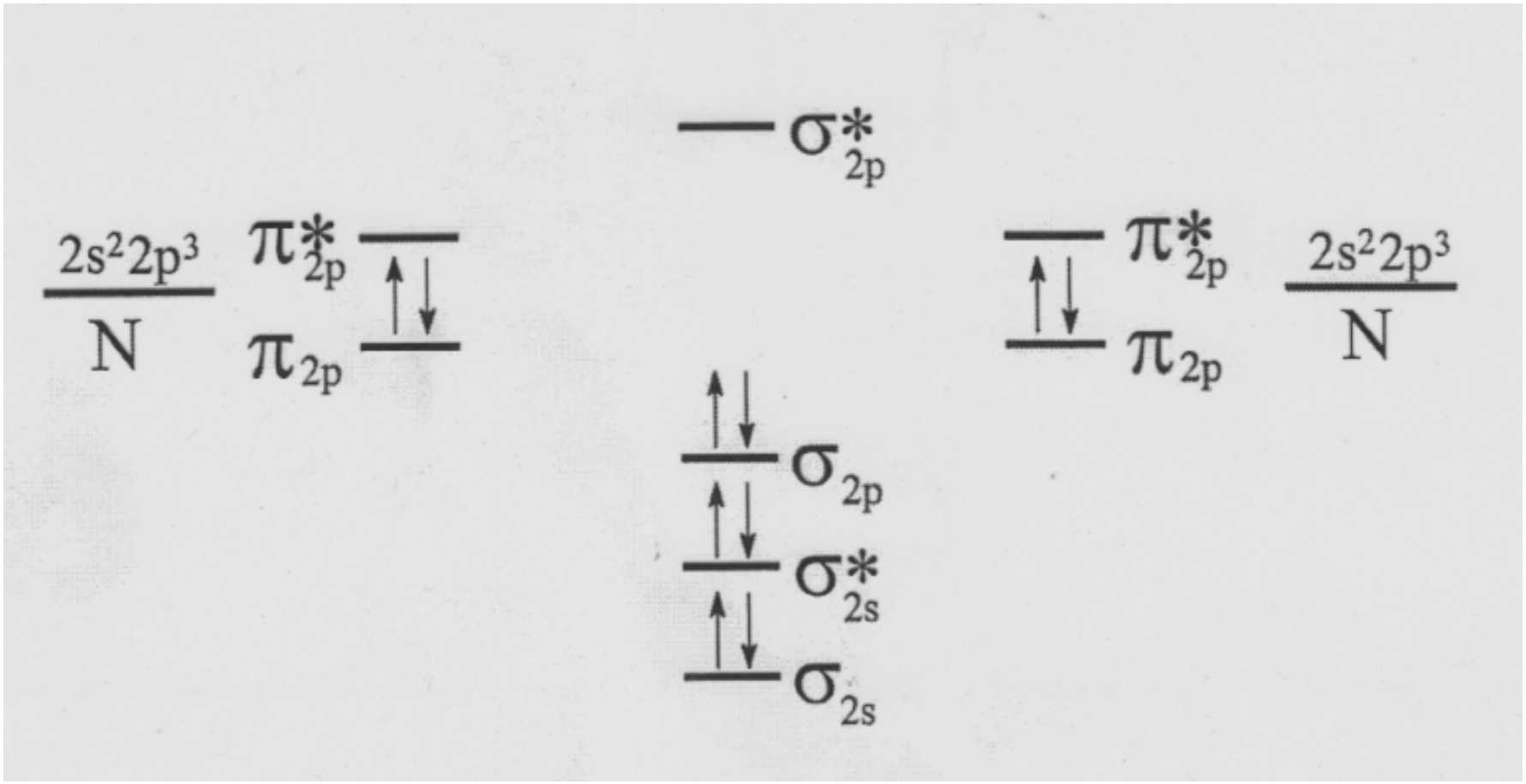


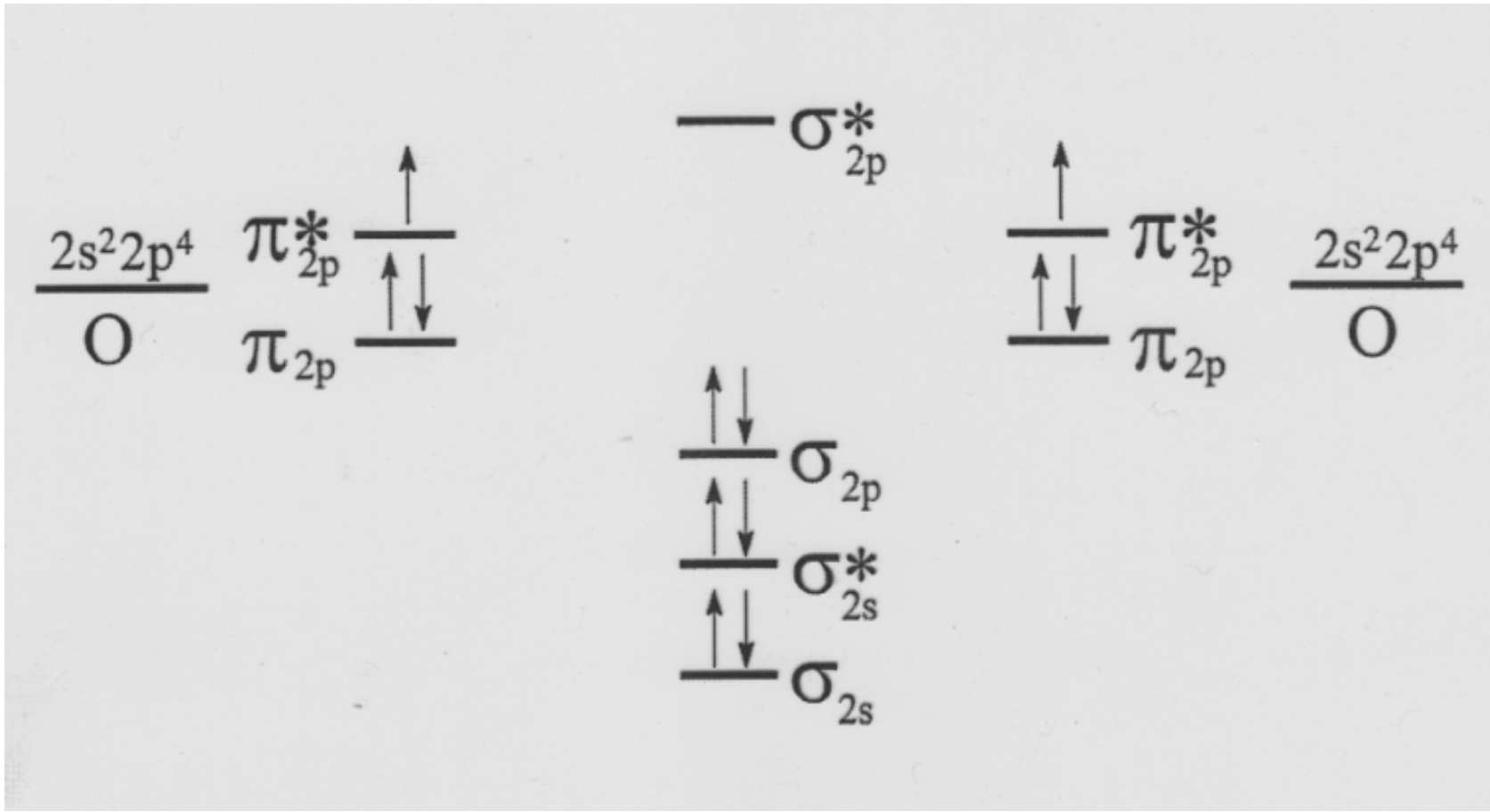
H

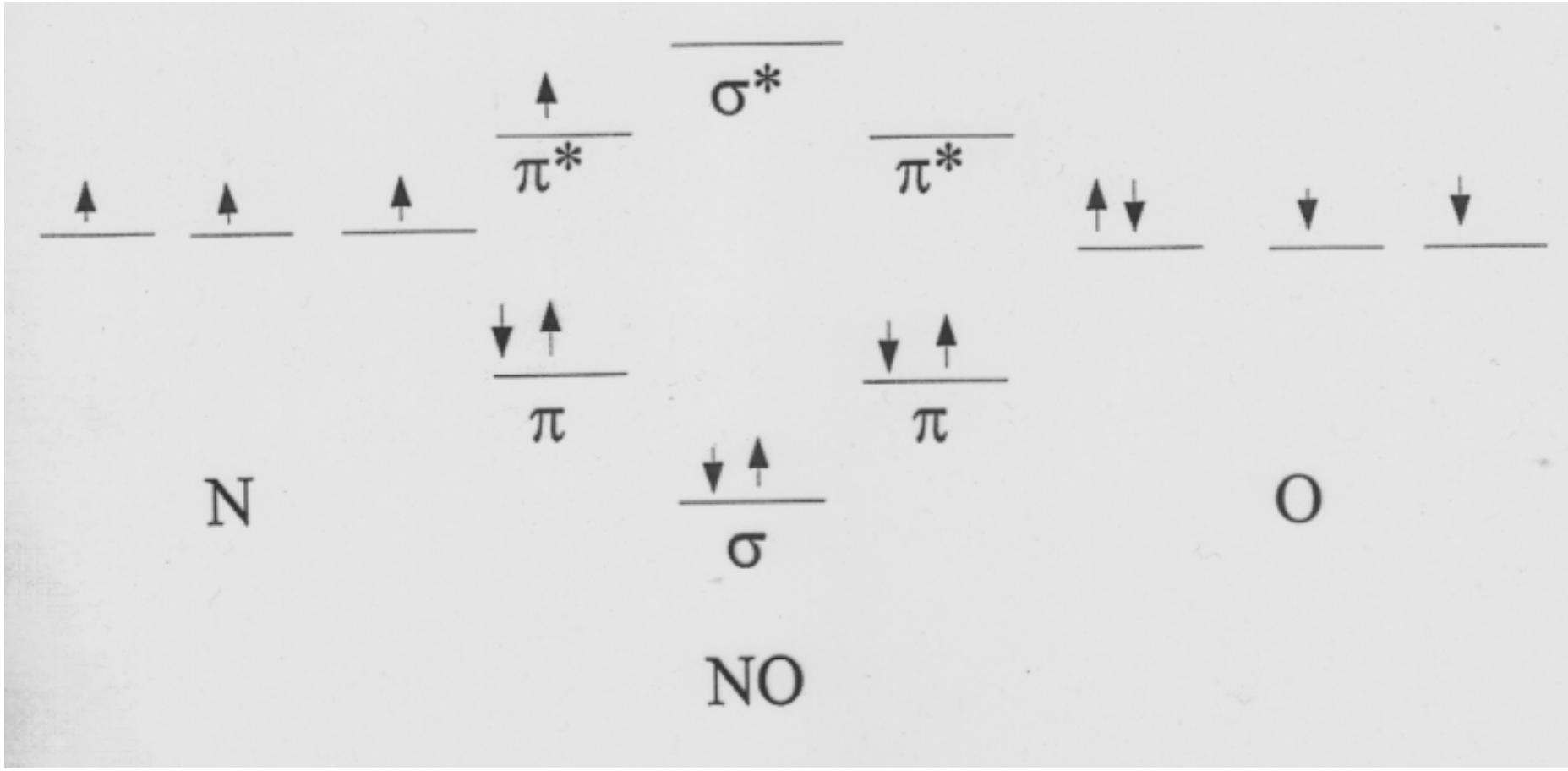
He

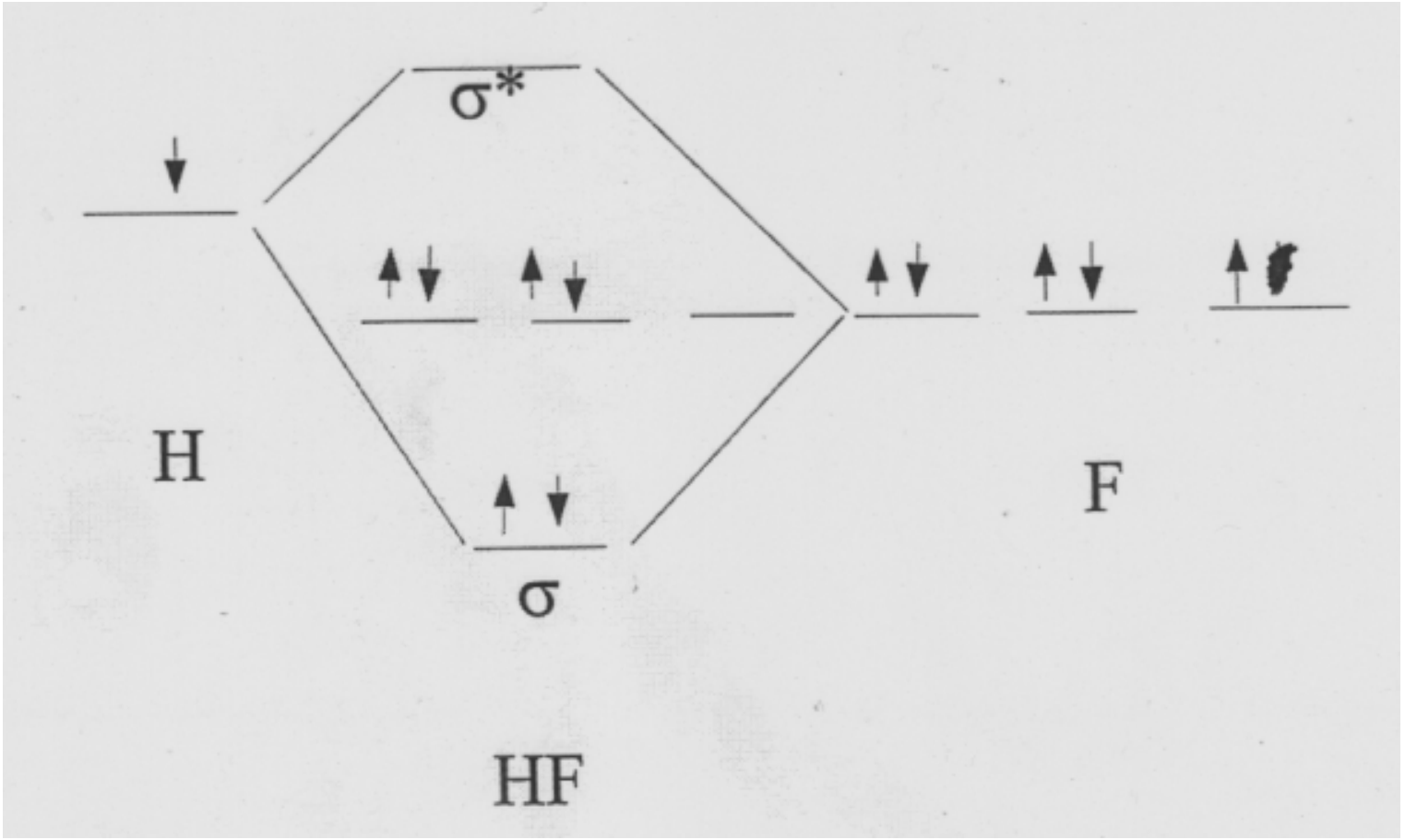


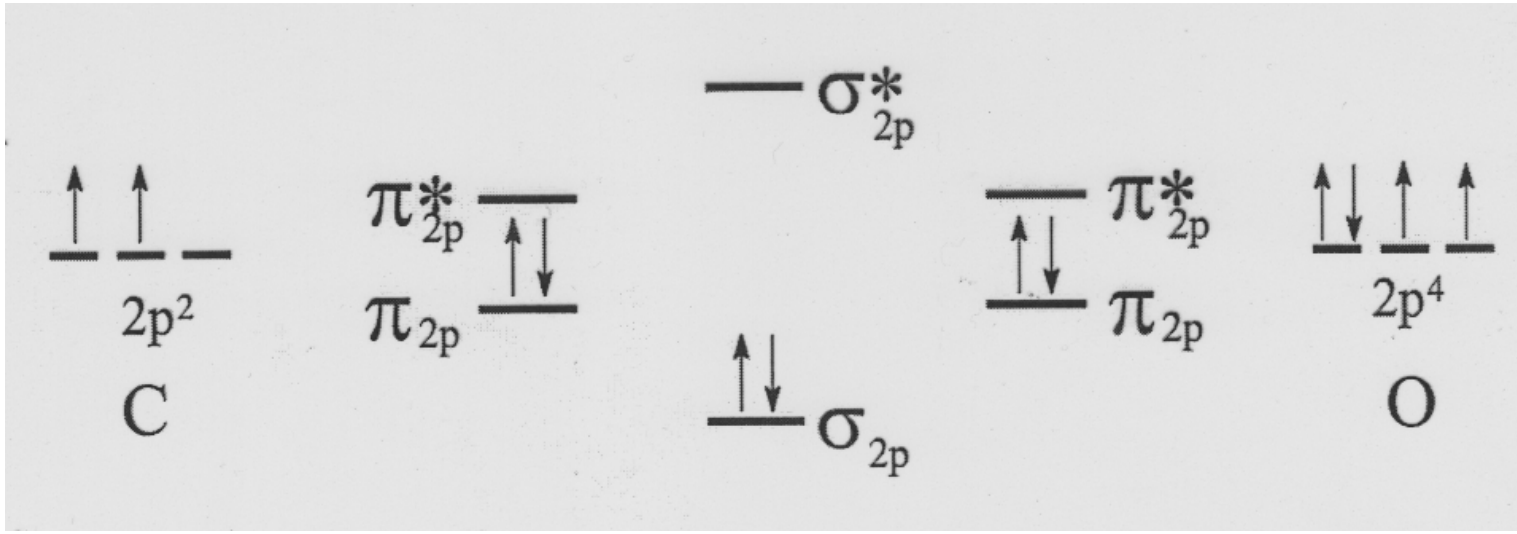
He


σ^*_{2p}
$2s^2 2p^3$
N
π^*_{2p}
π_{2p}
π^*_{2p}
π_{2p}
$2s^2 2p^3$
N
σ_{2p}
σ^*_{2s}
σ_{2s}


$2s^2 2p^4$
O
π^*_{2p}
π_{2p}
σ^*_{2p}
σ_{2p}
σ^*_{2s}
σ_{2s}
π^*_{2p}
π_{2p}
$2s^2 2p^4$
O


σ*
π*
π*
π
π
N
σ
O
NO


σ*
H
F
σ
HF


σ*2p
π*2p
π2p
π*2p
π2p
σ2p
2p2
2p4
C
O

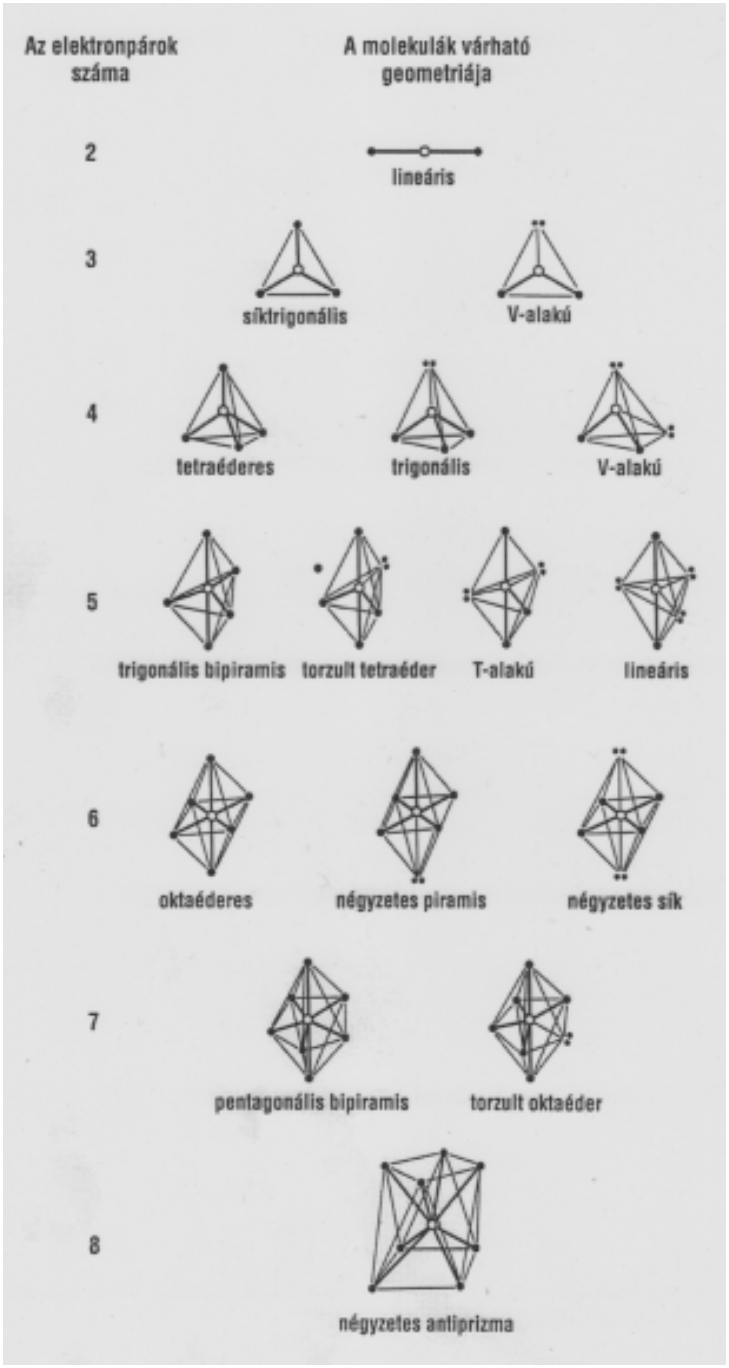
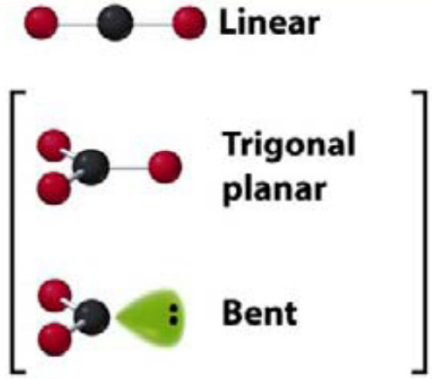

Az elektronpárok száma
A molekulák várható geometriája
2
lineáris
3
síktrigonális
V-alakú
4
tetraéderes
trigonális
V-alakú
5
trigonális bipiramis
torzult tetraéder
T-alakú
lineáris
6
oktaéderes
négyzetes piramis
négyzetes sík
7
pentagonális bipiramis
torzult oktaéder
8
négyzetes antiprizma

TABLE 7.4 Molecular Geometry Around Atoms with 2, 3, 4, 5, and 6 Charge Clouds

Number of Bonds	Number of Lone Pairs	Number of Charge Clouds	Molecular Geometry	Example
2	0	2	Linear	O=C=O
3	0	3	Trigonal planar	H, H, C=O
2	1		Bent	O, O, S
4	0	4	Tetrahedral	H, H, C, H, H
3	1		Trigonal pyramidal	H, H, N, H
2	2		Bent	H, O, H



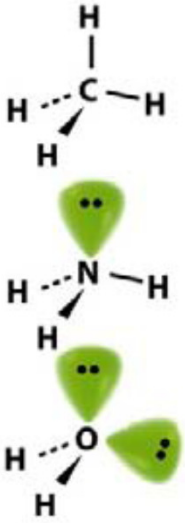


Table 7-4 part 1 Chemistry, 5/e

TABLE 7.4 Molecular Geometry Around Atoms with 2, 3, 4, 5, and 6 Charge Clouds

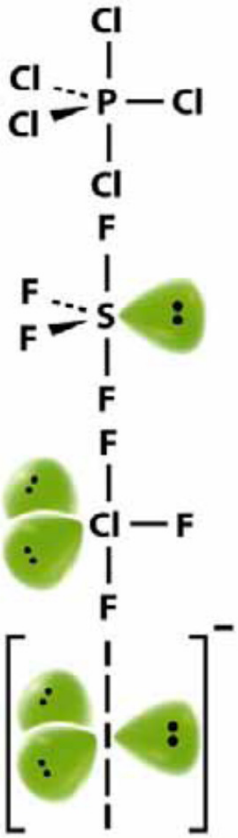
Number of Bonds	Number of Lone Pairs	Number of Charge Clouds	Molecular Geometry	Example
5	0	5	Trigonal bipyramidal	
4	1		Seesaw	
3	2		T-shaped	
2	3		Linear	

Table 7-4 part 2 Chemistry, 5/e

TABLE 7.4 Molecular Geometry Around Atoms with 2, 3, 4, 5, and 6 Charge Clouds

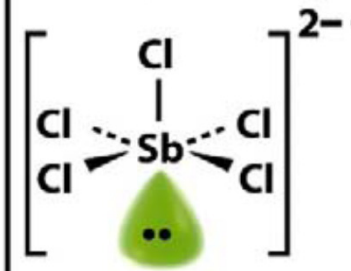
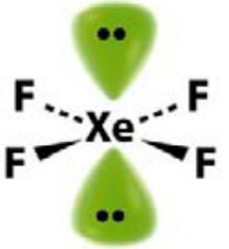
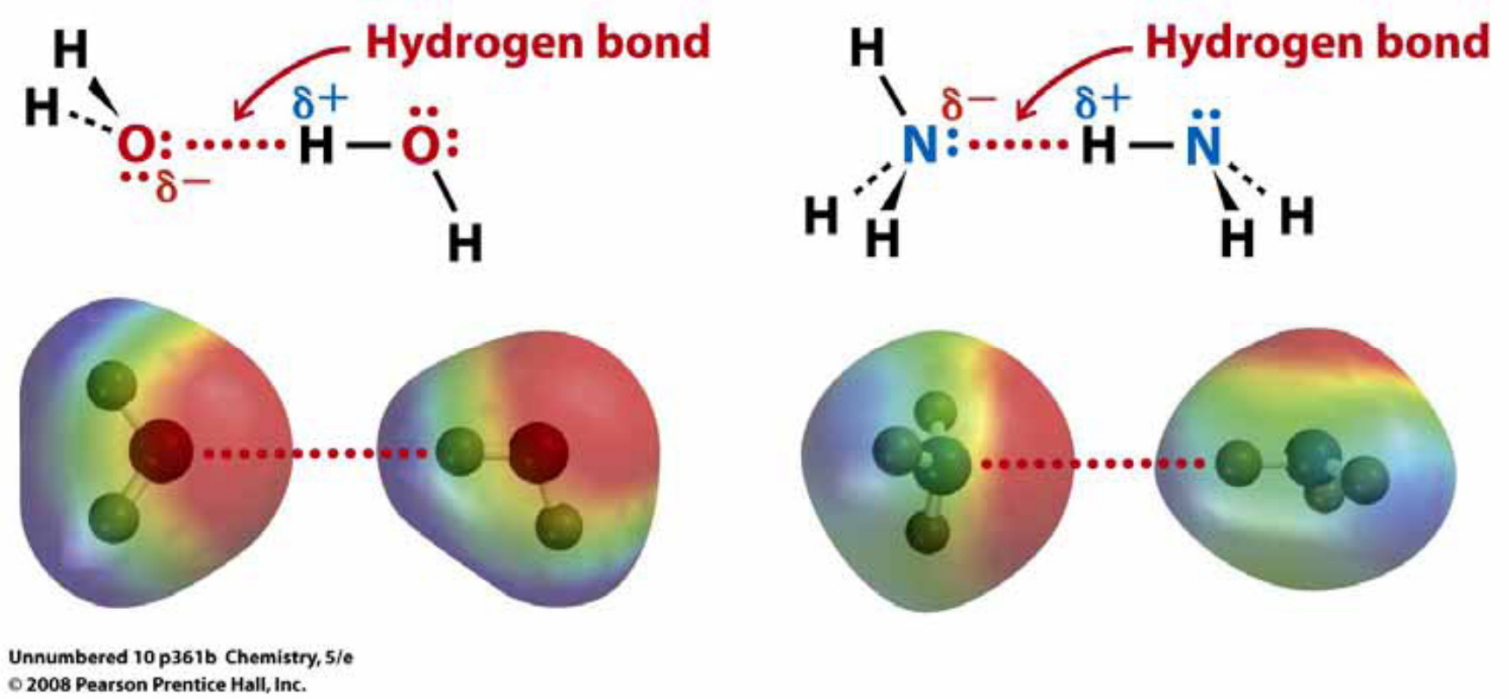
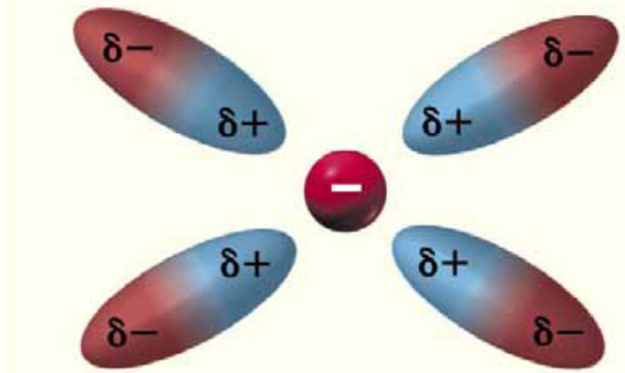
Number of Bonds	Number of Lone Pairs	Number of Charge Clouds	Molecular Geometry	Example
6	0	6	Octahedral	
5	1		Square pyramidal	
4	2		Square planar	

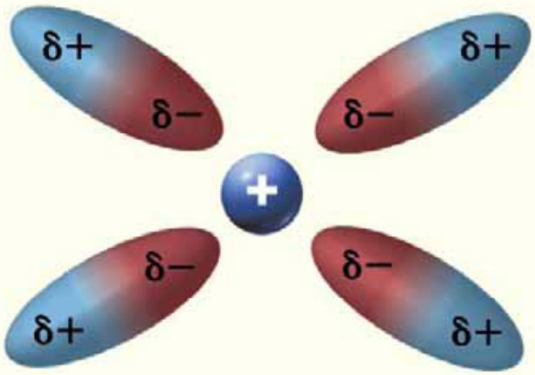
Table 7-4 part 3 Chemistry, 5/e



Unnumbered 10 p361b Chemistry, 5/e

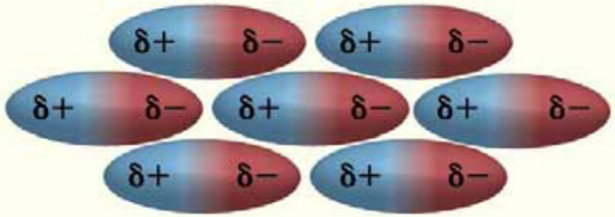


Polar molecules orient toward ions so that the positive end of the dipole is near an anion and...

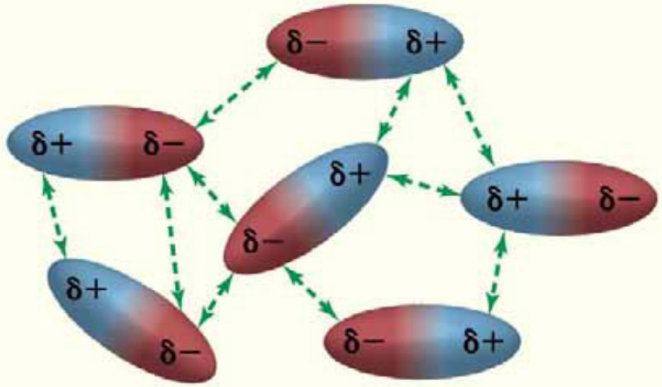


...the negative end of the dipole is near a cation.

Figure 10-3 Chemistry, 5/e



Polar molecules attract one another when they orient with unlike charges close together, but...



...they repel one another when they orient with like charges together.

Figure 10-4 Chemistry, 5/e