



# 化学II

## 補助資料

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# 周期表と電気陰性度

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	H 2.2																	He
2	Li 1.0	Be 1.6											B 2.0	C 2.6	N 3.0	O 3.4	F 4.0	Ne
3	Na 0.9	Mg 1.3											Al 1.6	Si 1.9	P 2.2	S 2.6	Cl 3.2	Ar
4	K 0.8	Ca 1.0	Sc 1.4	Ti 1.5	V 1.6	Cr 1.7	Mn 1.6	Fe 1.8	Co 1.9	Ni 1.9	Cu 1.9	Zn 1.7	Ga 1.8	Ge 2.0	As 2.2	Se 2.6	Br 3.0	Kr 3.0
5	Rb 0.8	Sr 1.0	Y 1.2	Zr 1.3	Nb 1.6	Mo 2.2	Tc	Ru 2.2	Rh 2.3	Pd 2.2	Ag 1.9	Cd 1.7	In 1.8	Sn 2.0	Sb 2.1	Te 2.1	I 2.7	Xe 2.6
6	Cs 0.8	Ba 0.9		Hf 1.3	Ta 1.5	W 2.4	Re	Os 2.2	Ir 2.2	Pt 2.3	Au 2.5	Hg 2.0	Tl 2.0	Pb 2.3	Bi 2.0	Po 2.0	At	Rn
7	Fr 0.8	Ra 0.9		Rf	Db	Sg	Bh	Hs	Mt	Ds								

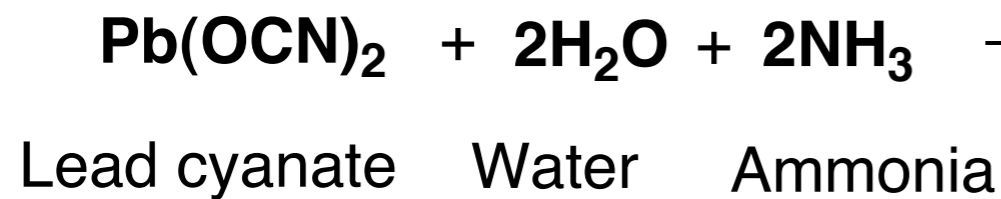
sブロック元素  
pブロック元素  
dブロック元素

	→	La 1.1	Ce 1.1	Pr 1.1	Nd 1.1	Pm 1.2	Sm 1.2	Eu 1.2	Gd 1.2	Tb 1.2	Dy 1.2	Ho 1.2	Tm 1.3	As 2.2	Yb	Lu 1.0
	→	Ac 1.2	Th 1.3	Pa 1.3	U 1.4	Np 1.4	Pu 1.3	Am	Cm	Bk	Cf	Es	Md	As	No	Lr

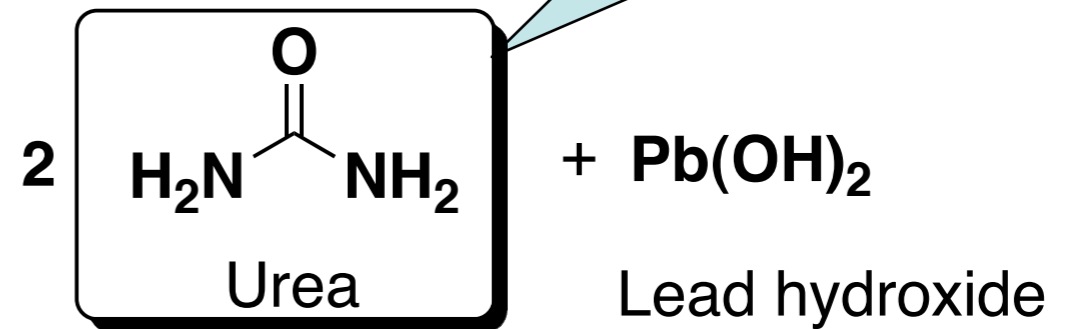
# 有機化合物とは？

植物や動物が作り出す化合物？

1828年 Friedrich Wöhler



Inorganic molecule

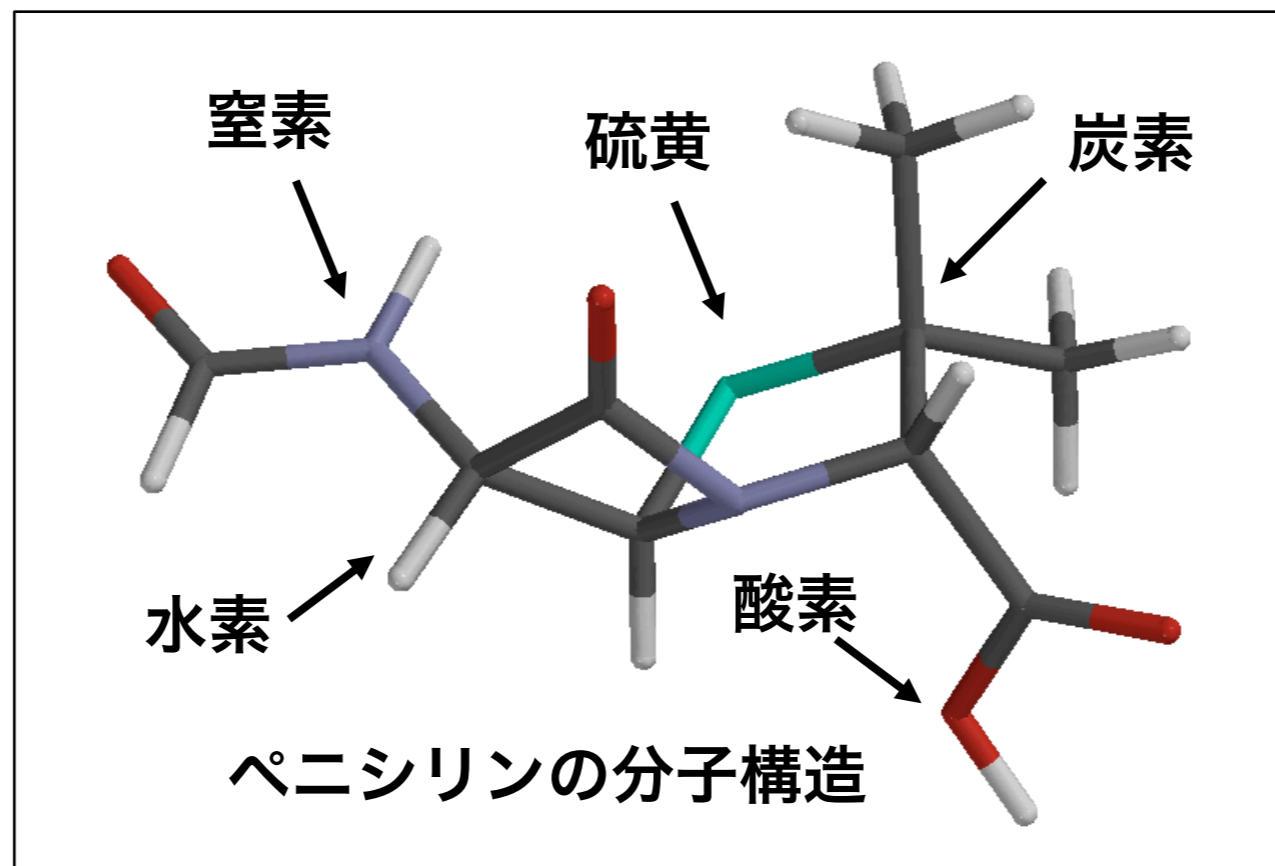


Organic molecule

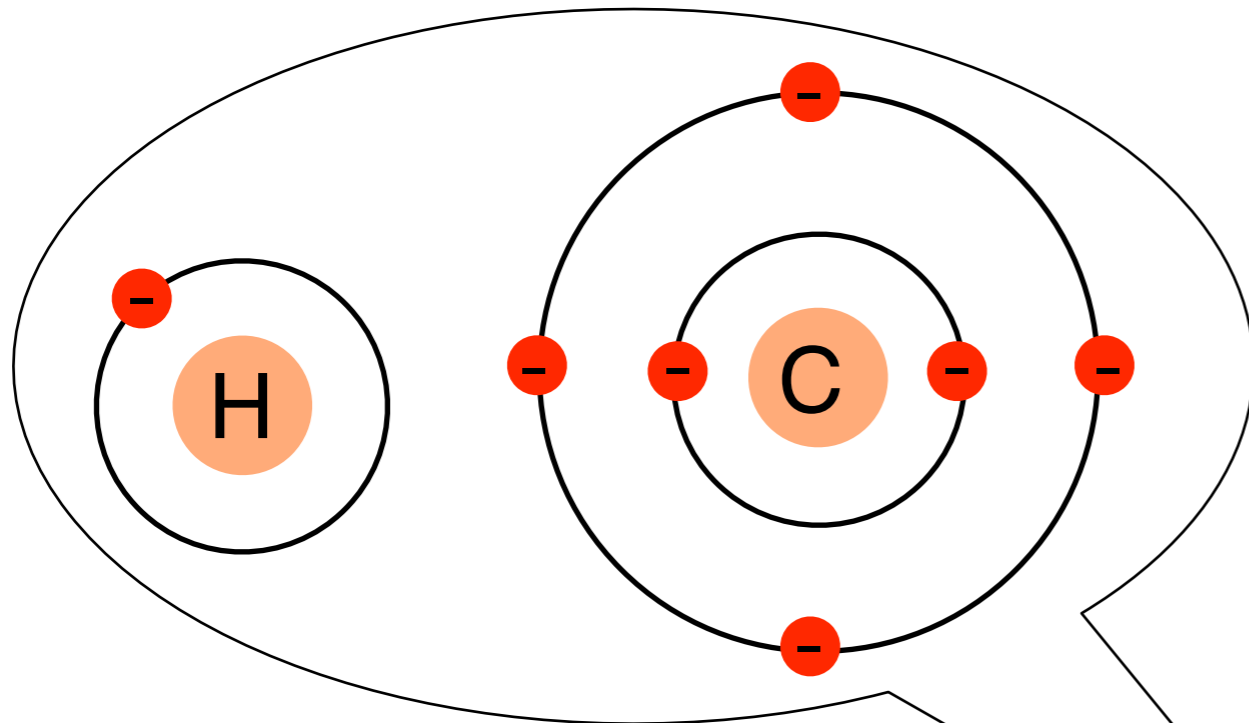
2009年  
5000万種の  
有機化合物

# 有機化合物の特徴

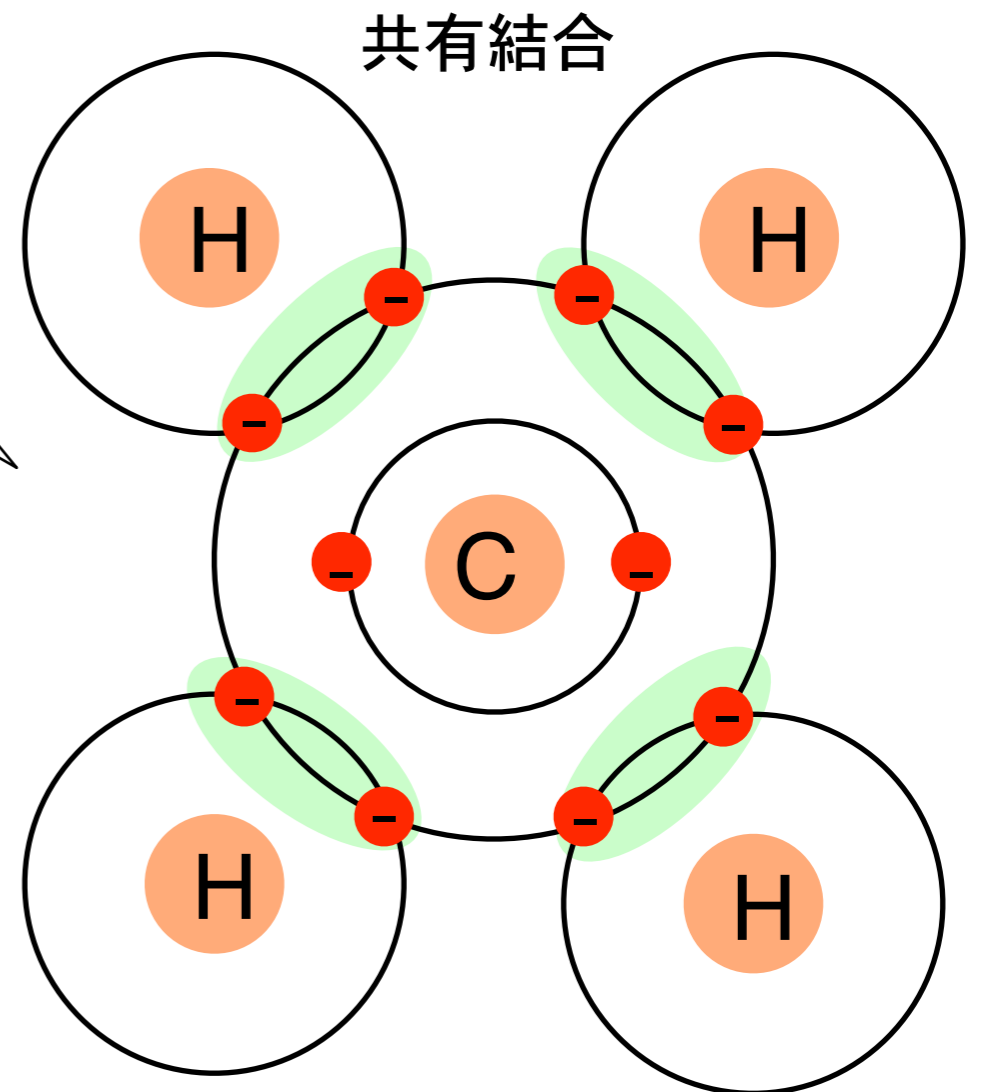
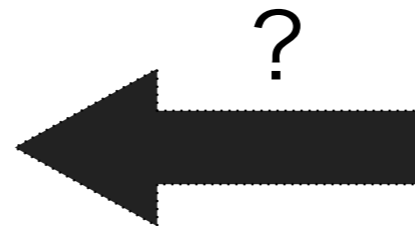
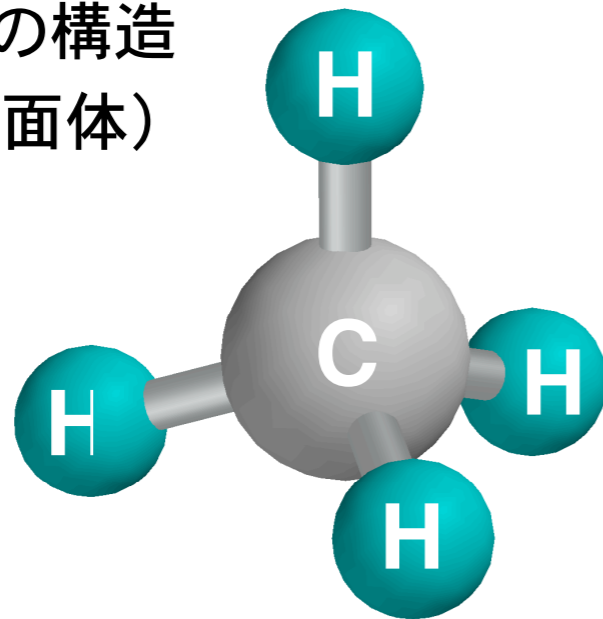
- 多彩で強い炭素-炭素（共有）結合の形成（ $\sigma$ 結合）
- 長く繋がる・分岐する・環を巻く
- 二重結合、三重結合（ $\pi$ 結合）
- 水素、酸素、窒素、硫黄、リン、ハロゲンとも強い結合（官能基）
- 周期表のあらゆる元素を対象



# 共有結合 (強い)

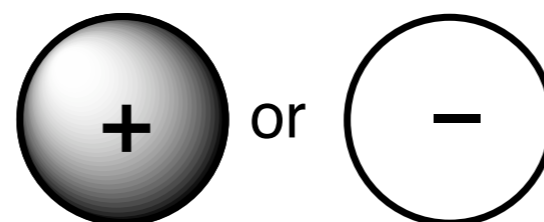


メタンの構造  
(正四面体)

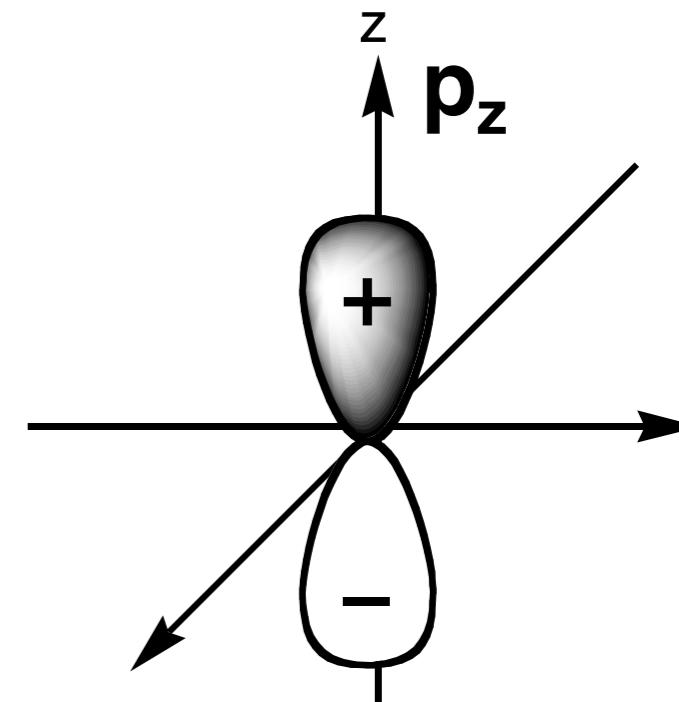
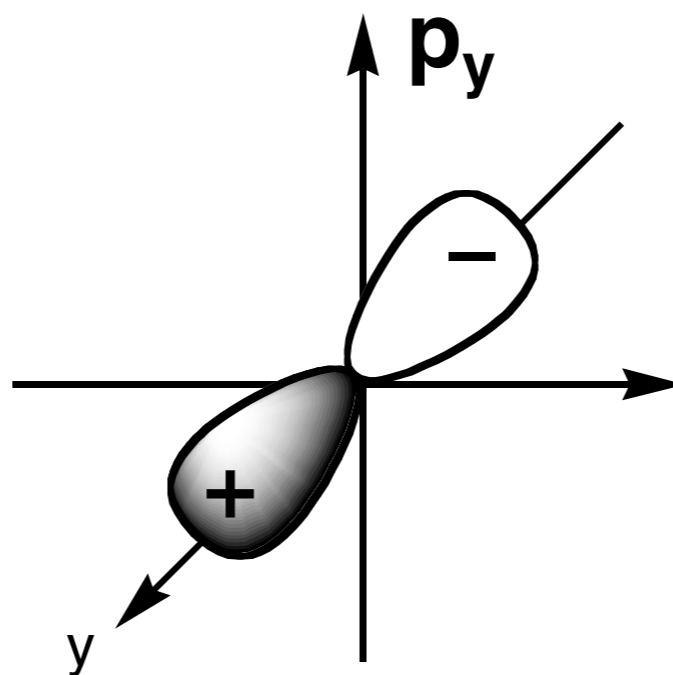
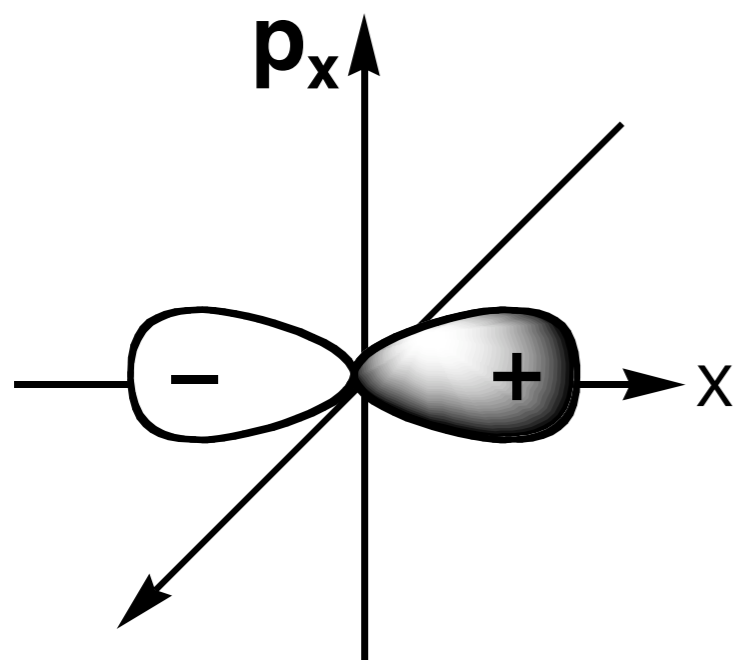


# 原子軌道のかたち

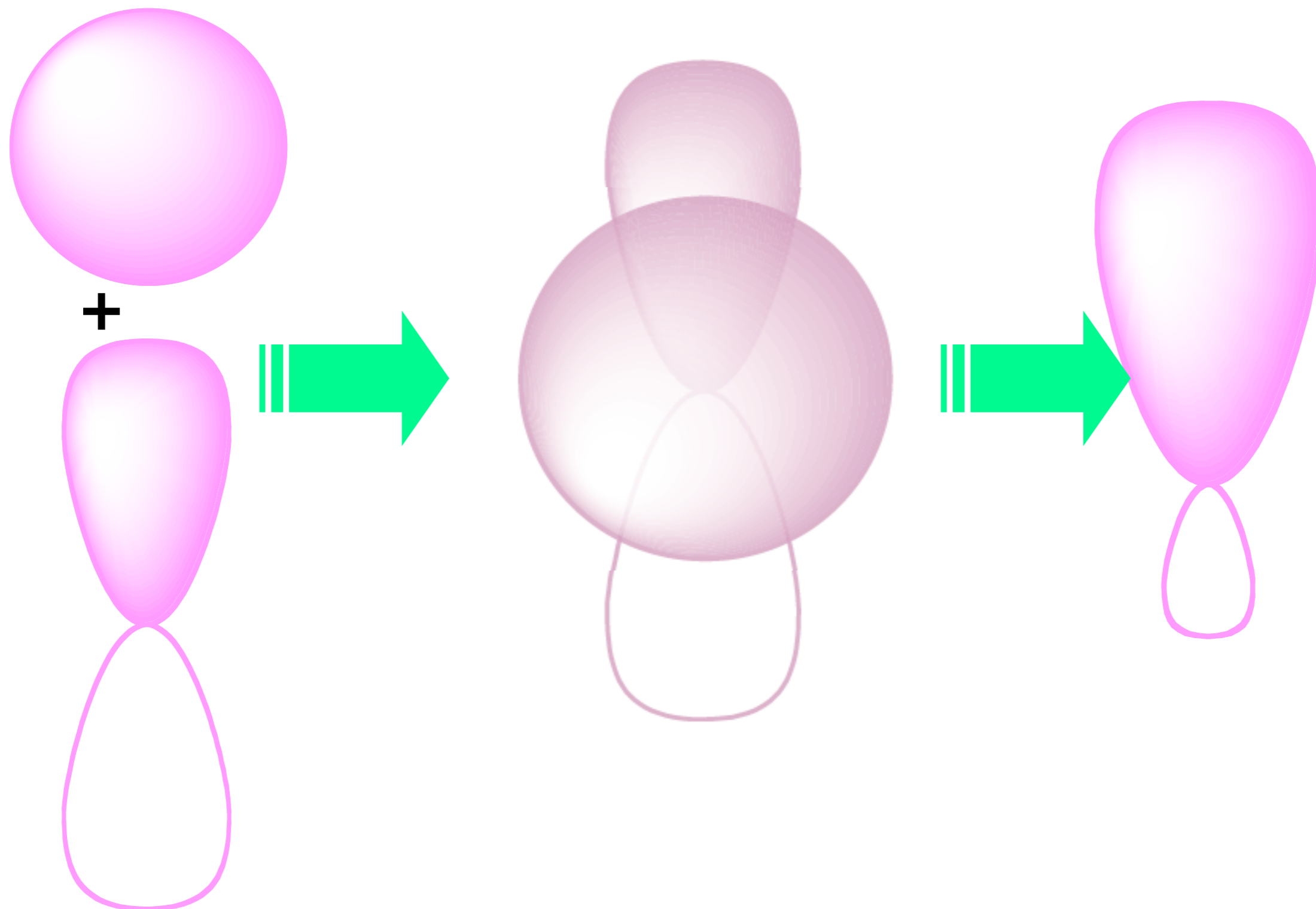
## S軌道



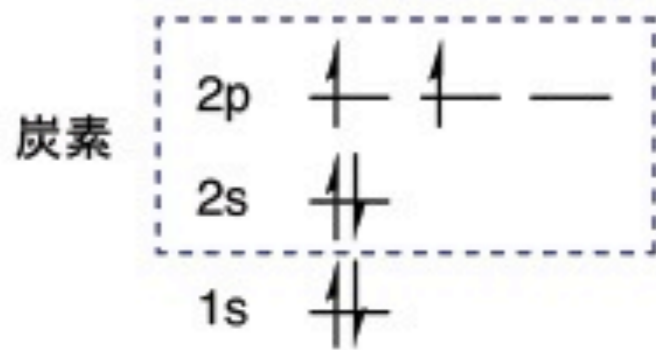
## P軌道



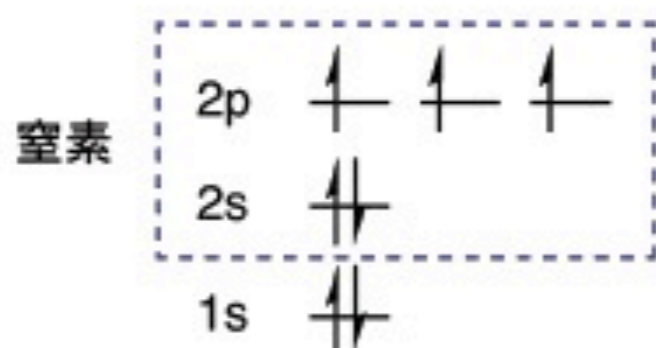
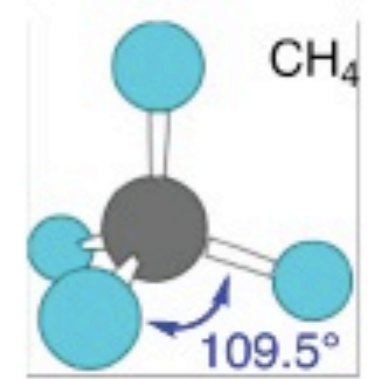
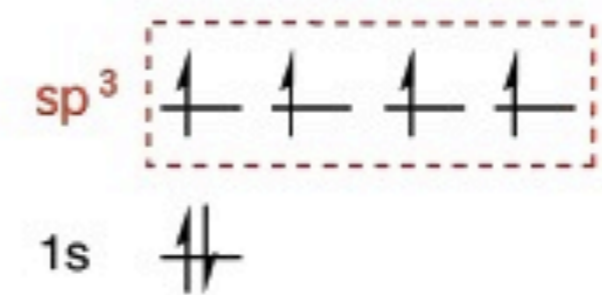
# 軌道の混成



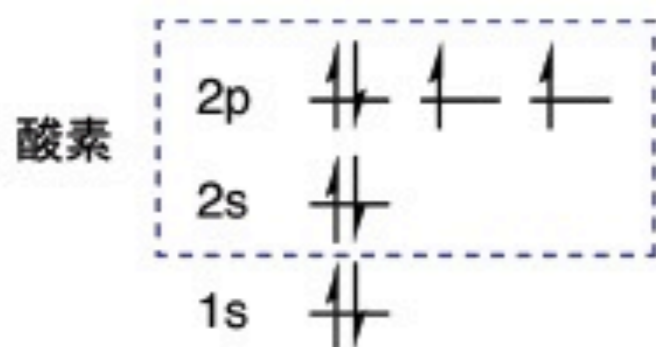
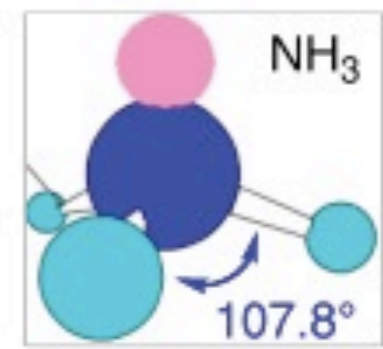
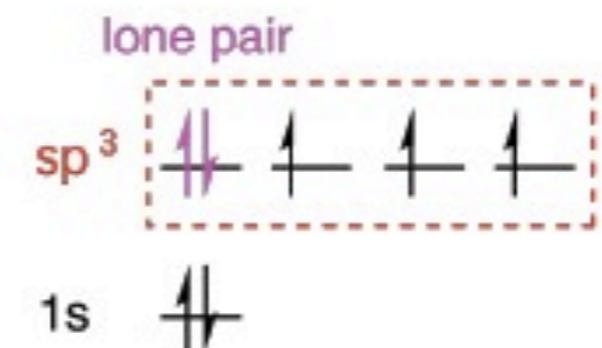
# sp<sup>3</sup>混成軌道: 炭素、窒素、酸素原子



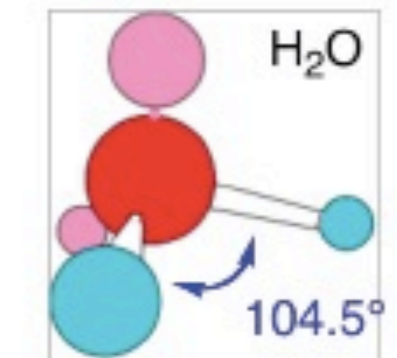
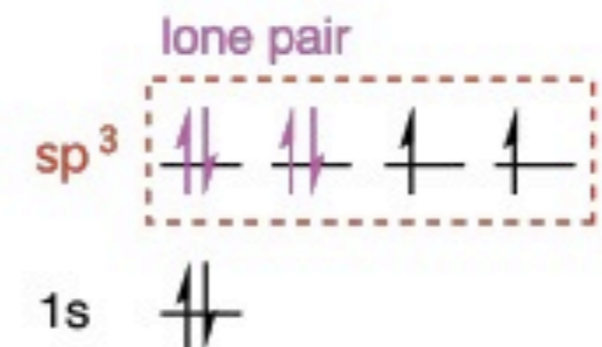
sp<sup>3</sup>混成



sp<sup>3</sup>混成

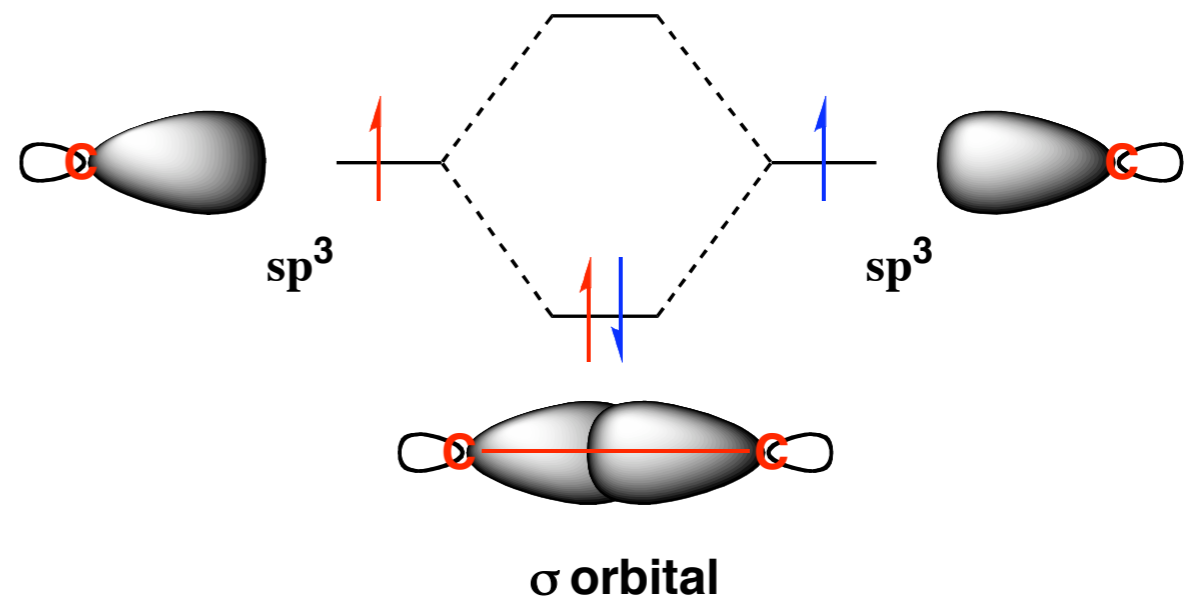
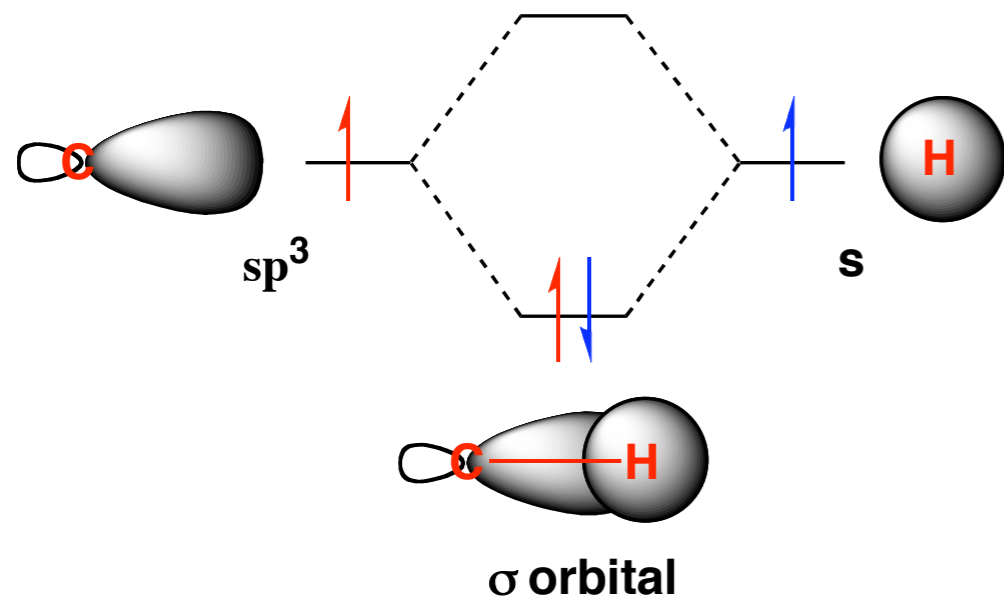


sp<sup>3</sup>混成

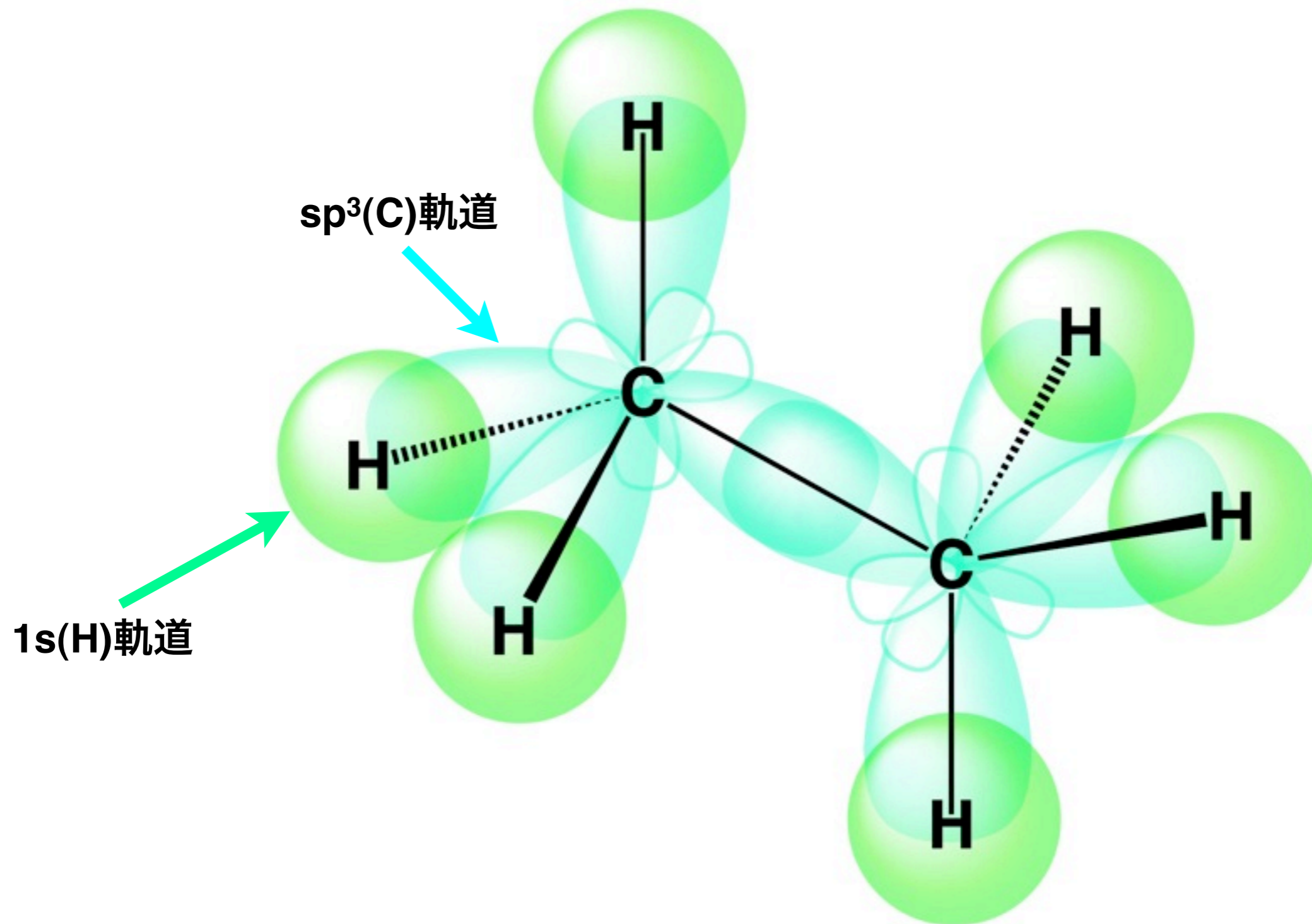




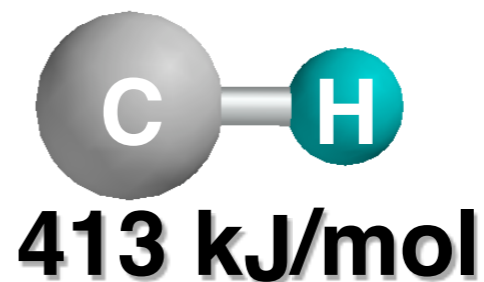
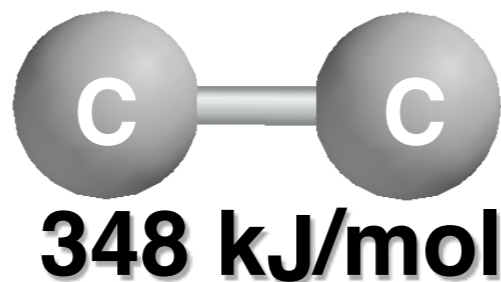
# σ 軌道 (単結合) の形成



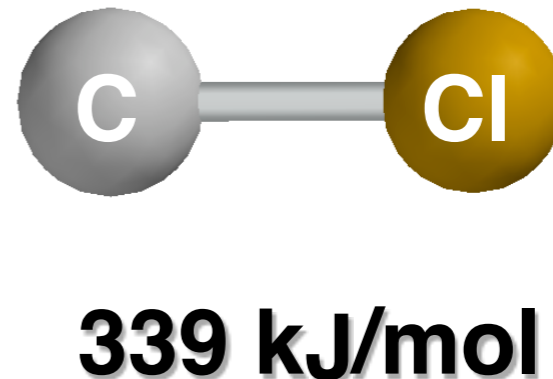
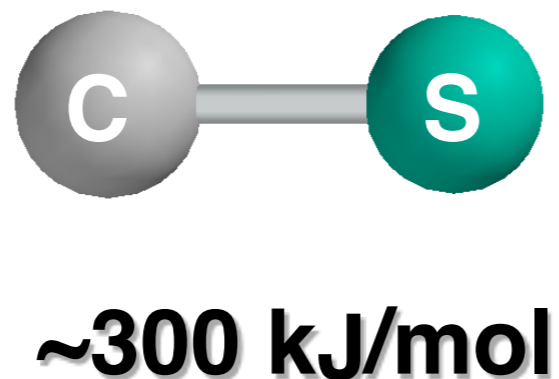
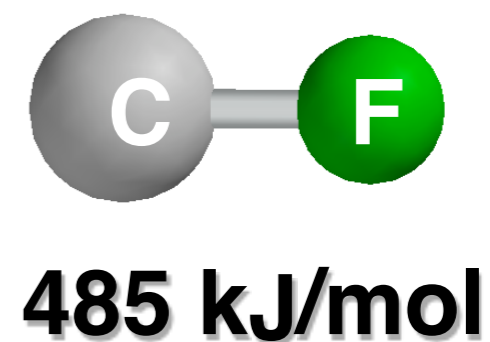
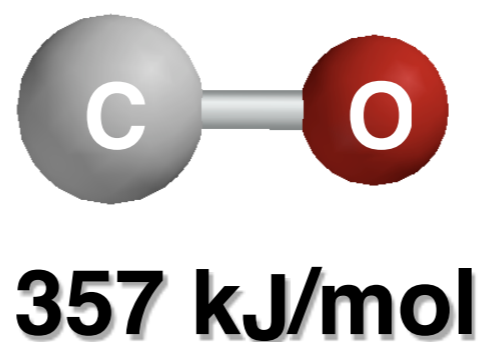
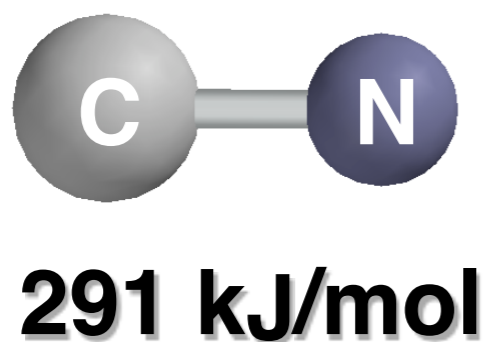
# エタンの構造 (σ<sub>C-H</sub>結合とσ<sub>C-C</sub>結合の様子)



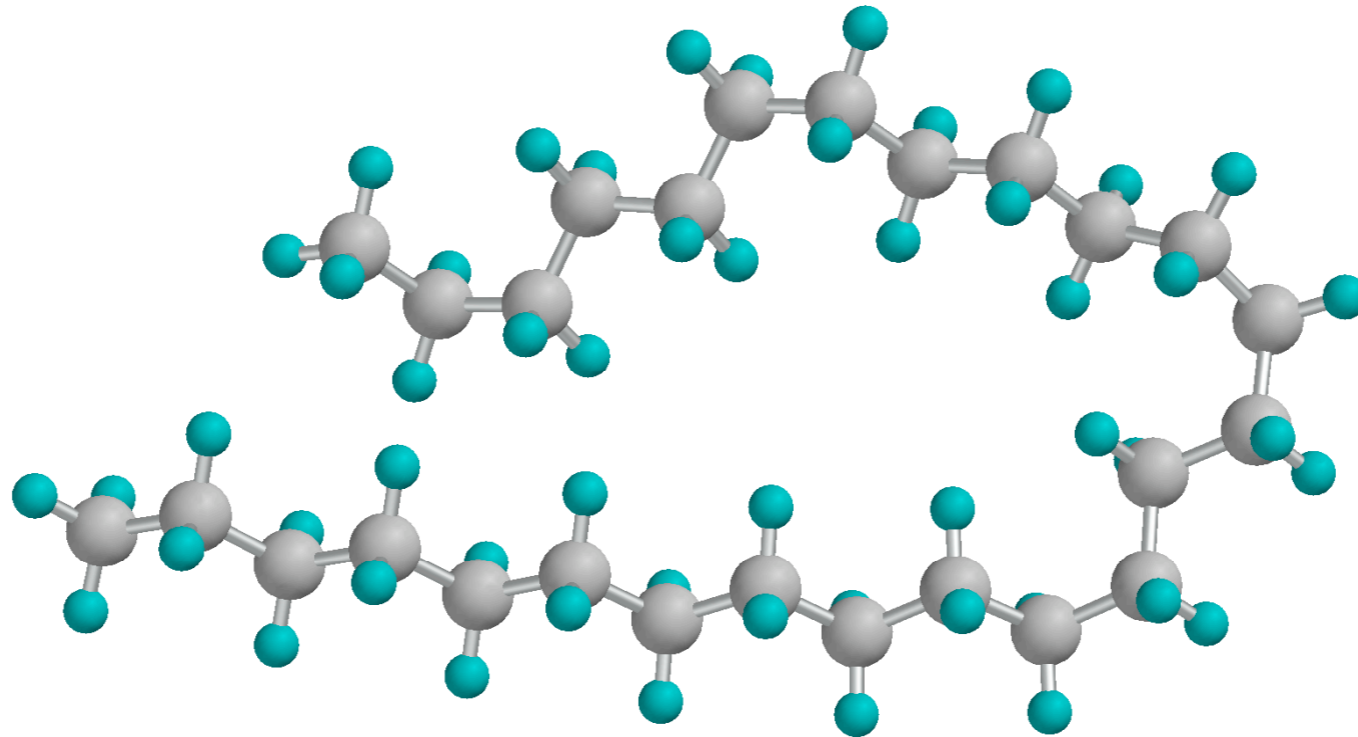
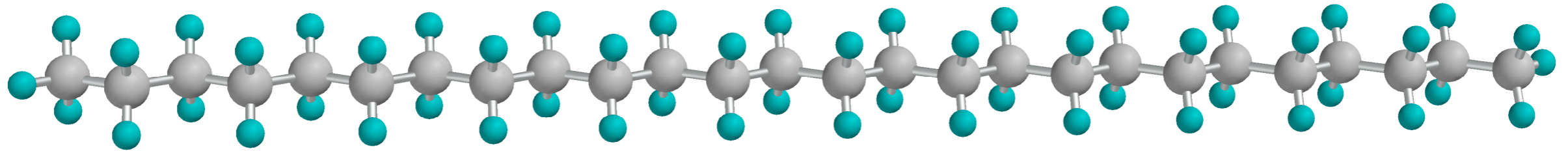
# 安定な結合 = 低反応性？



イオン結合性 ( $C^{\delta+}-X^{\delta-}$ )  反応性大

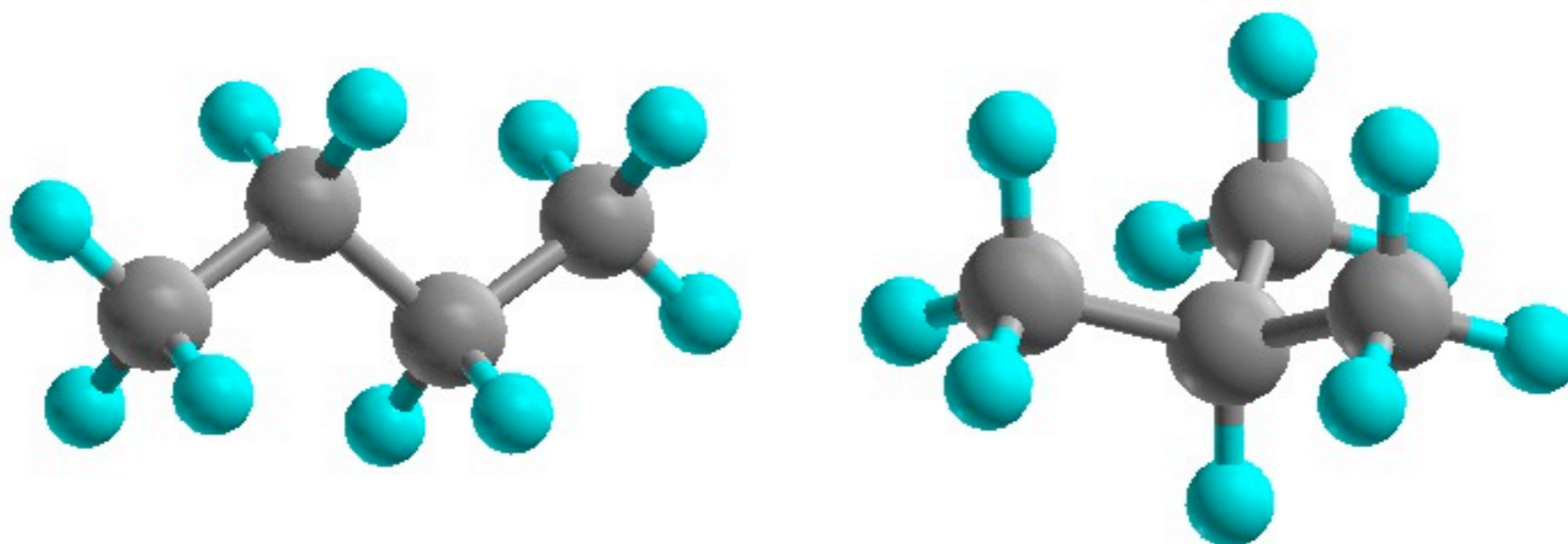


# 鎖状に伸びる👉 高分子化合物（プラスチック、樹脂）



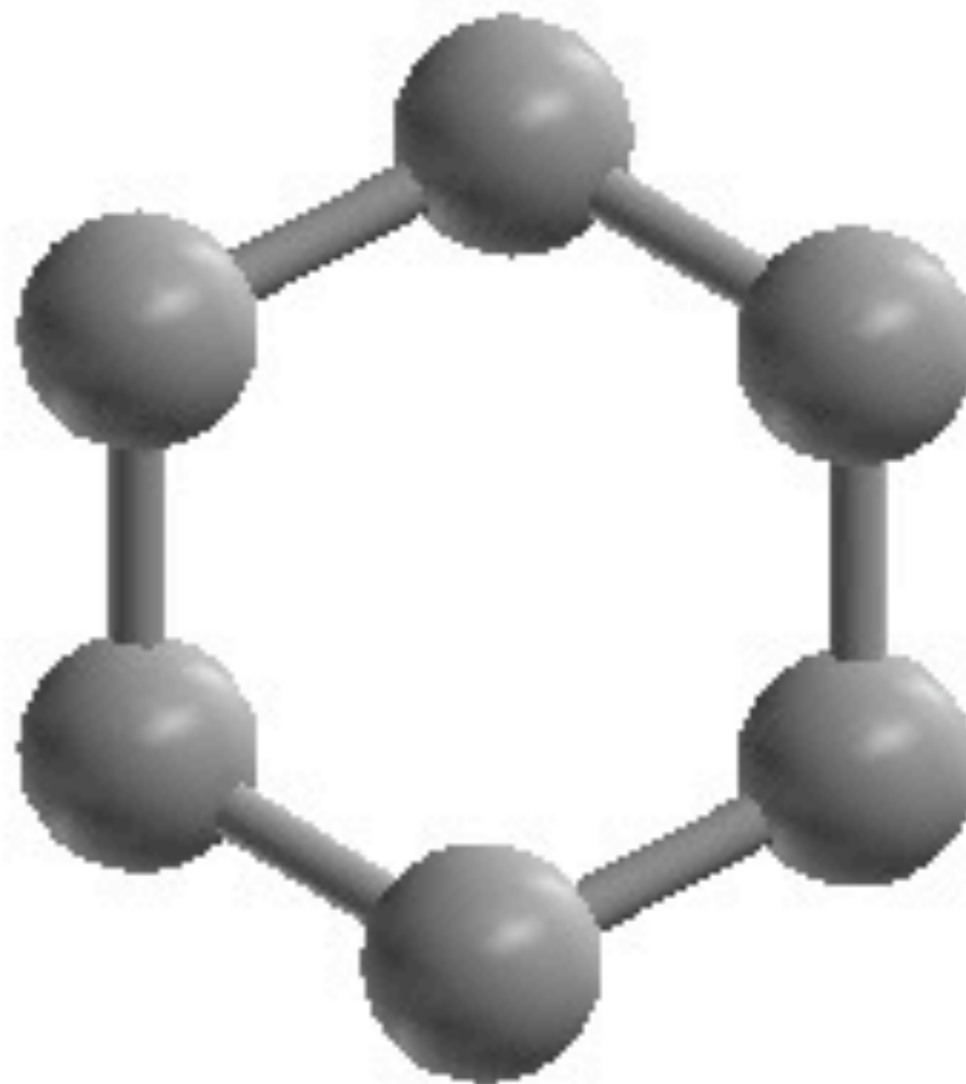
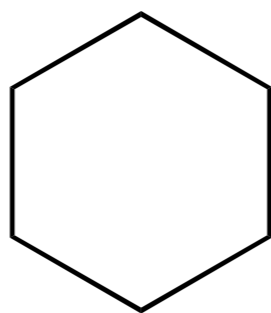
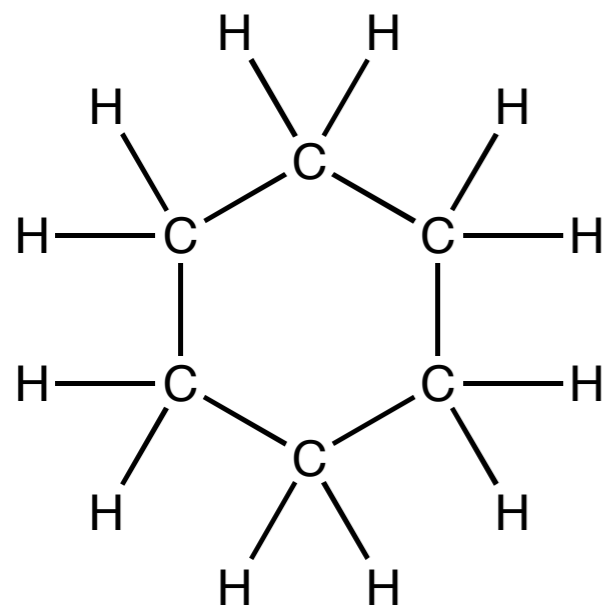
ポリエチレン

# 分岐する



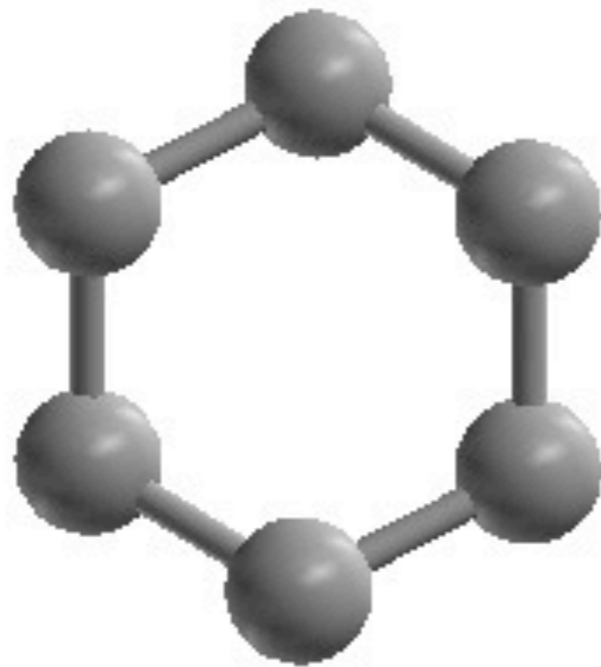
どちらもC<sub>4</sub>H<sub>10</sub> → 構造異性体

# 環を巻く (炭素原子が3個以上)

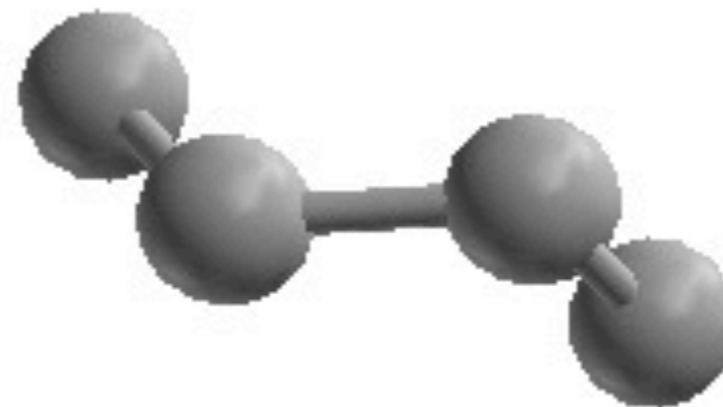


シクロヘキサンは正六角形か？

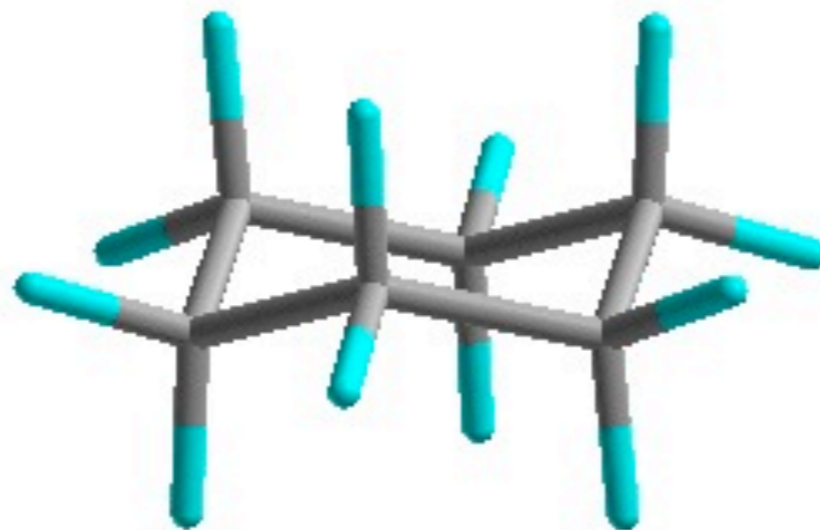
# シクロヘキサンの構造



正六角形？

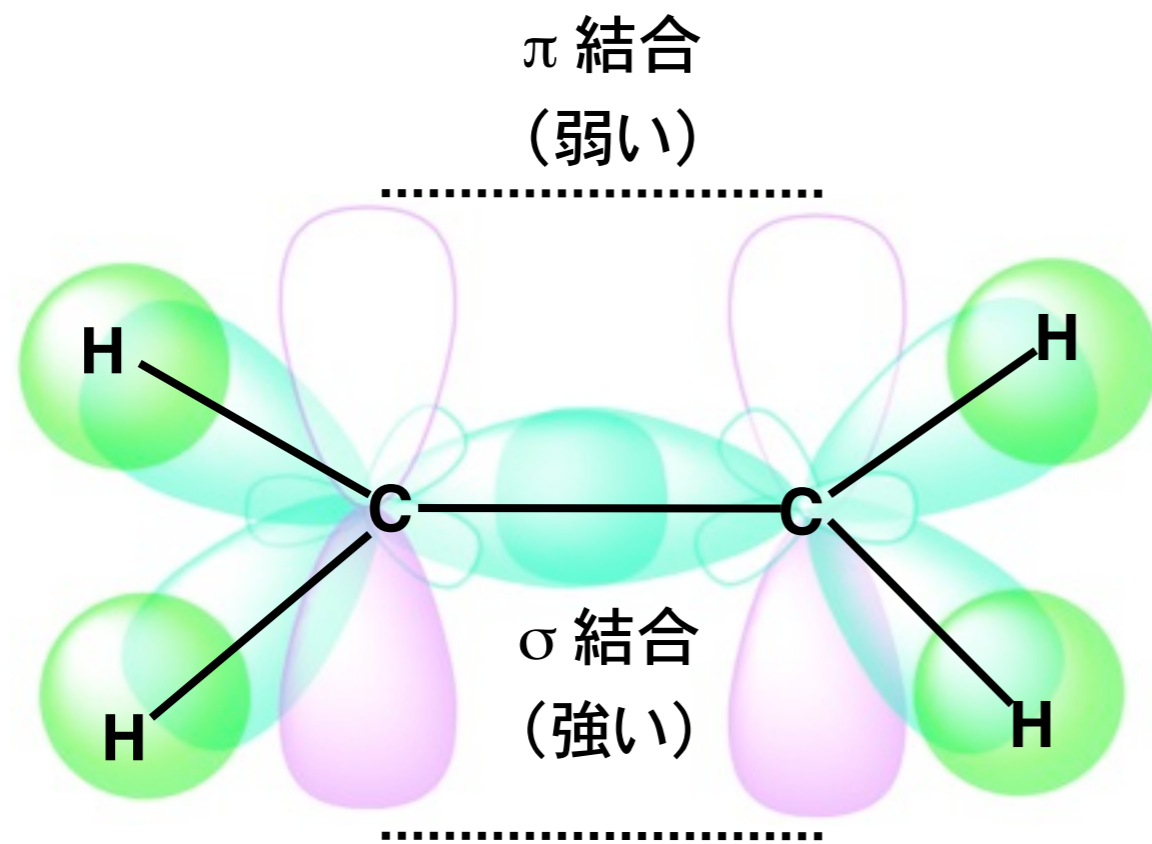


横から見ると？



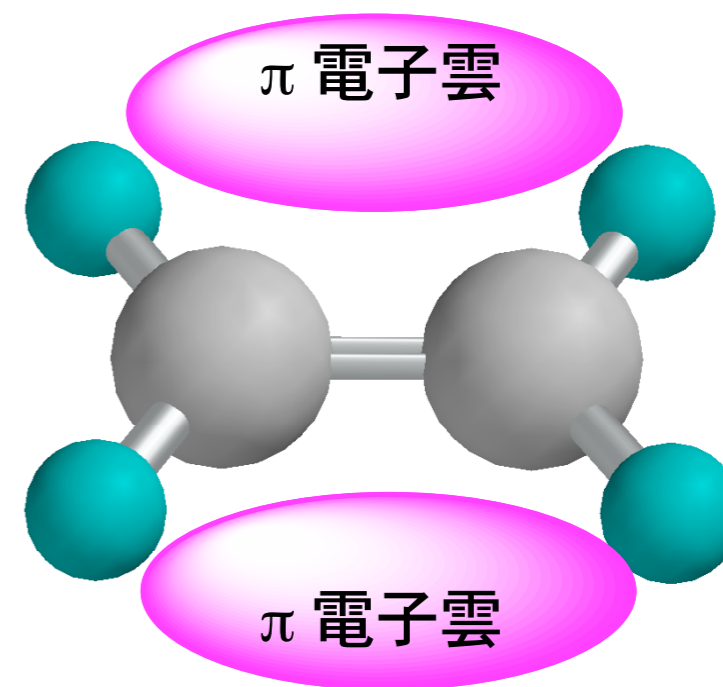
シクロヘキサン (いす型)

# 二重結合: 結合が2本?



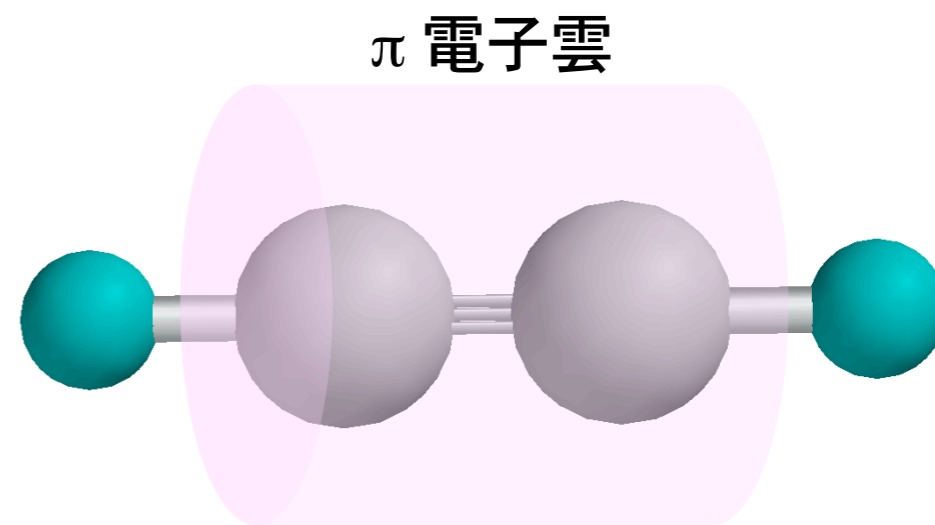
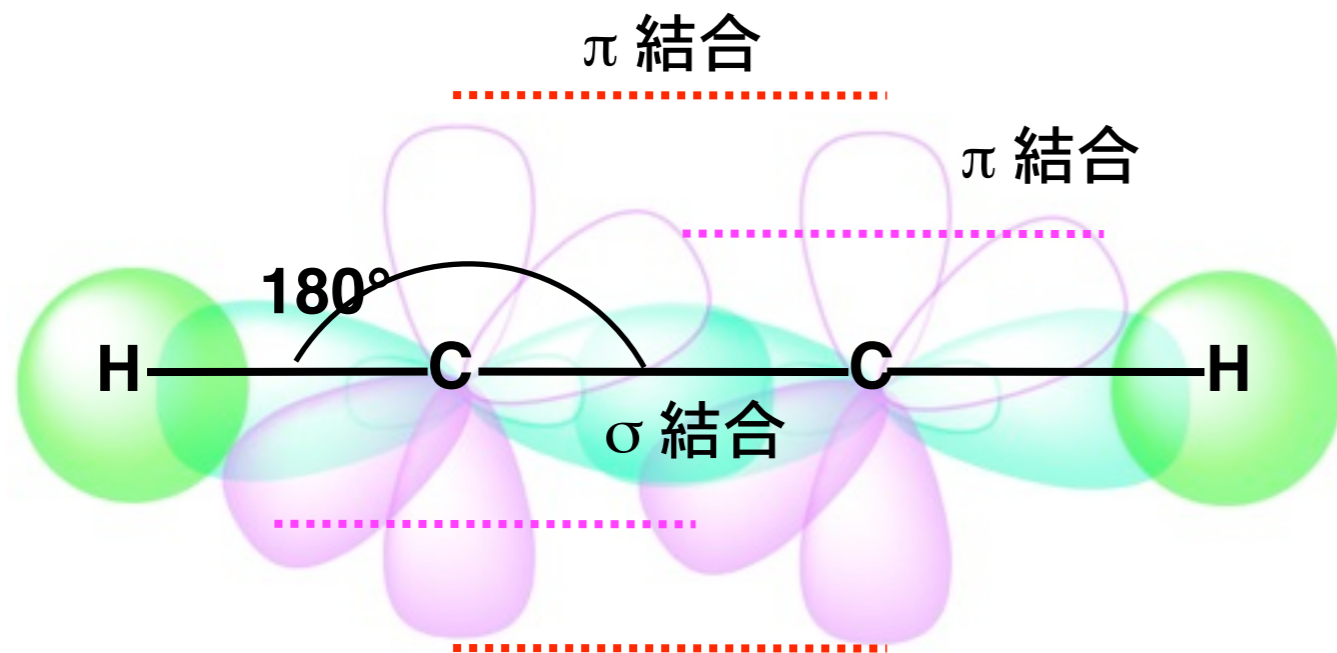
**C=C: 0.13 nm  
719 kJ/mol**

容易に反応  
(切断される)





# 三重結合：結合が3本？



$\text{C}\equiv\text{C}$ : 0.12 nm  
957 kJ/mol

# ベンゼン

