原子结构与键合

Dongsheng Wen

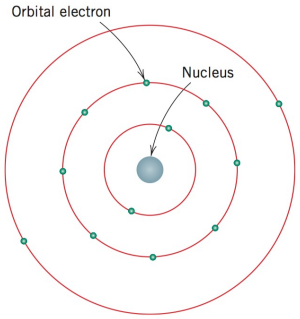
原子的结构

- 卢瑟福（Rutherford）的金箔实验（1908-1913）
  - 三个人儿：Geiger，Marsden和Rutherford
  - 金箔
  - Alpha 粒子

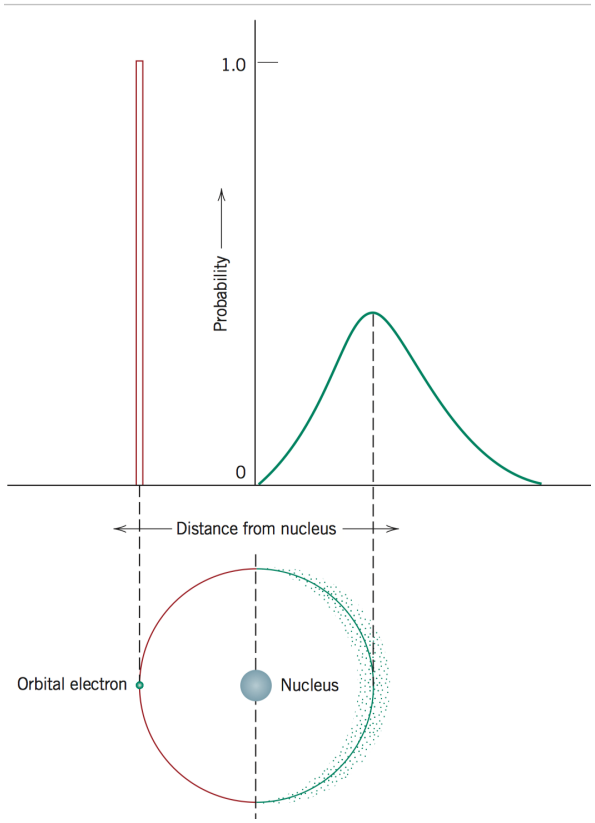
  - 结论

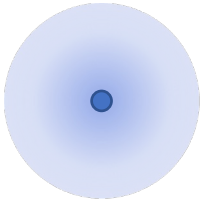
原子的结构

- 原子与核外电子（早期波尔模型-Bohr）



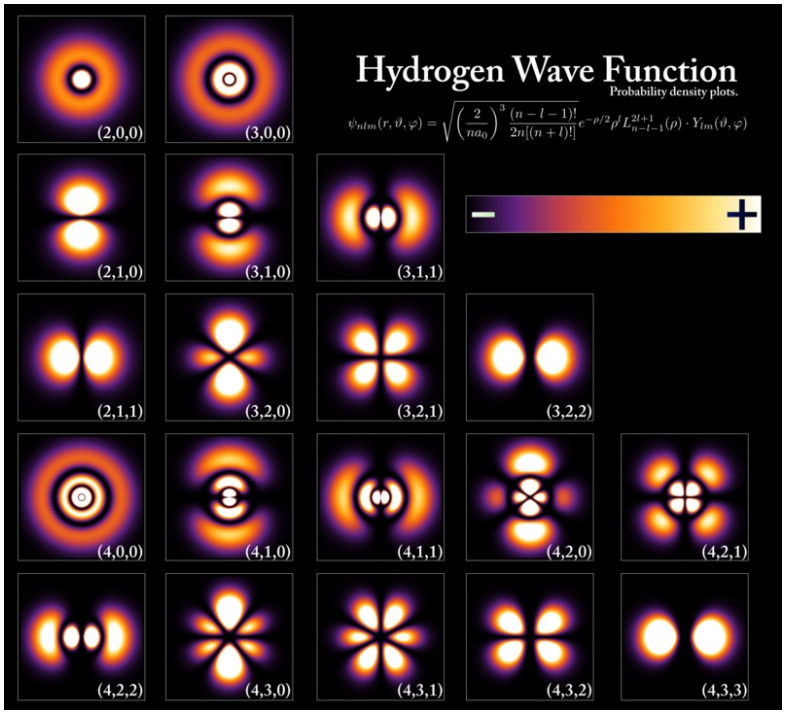
- 电子的波形态

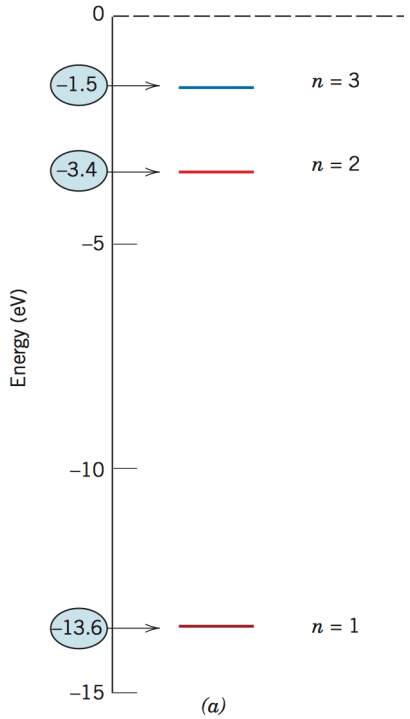




原子的结构

- 电子轨道

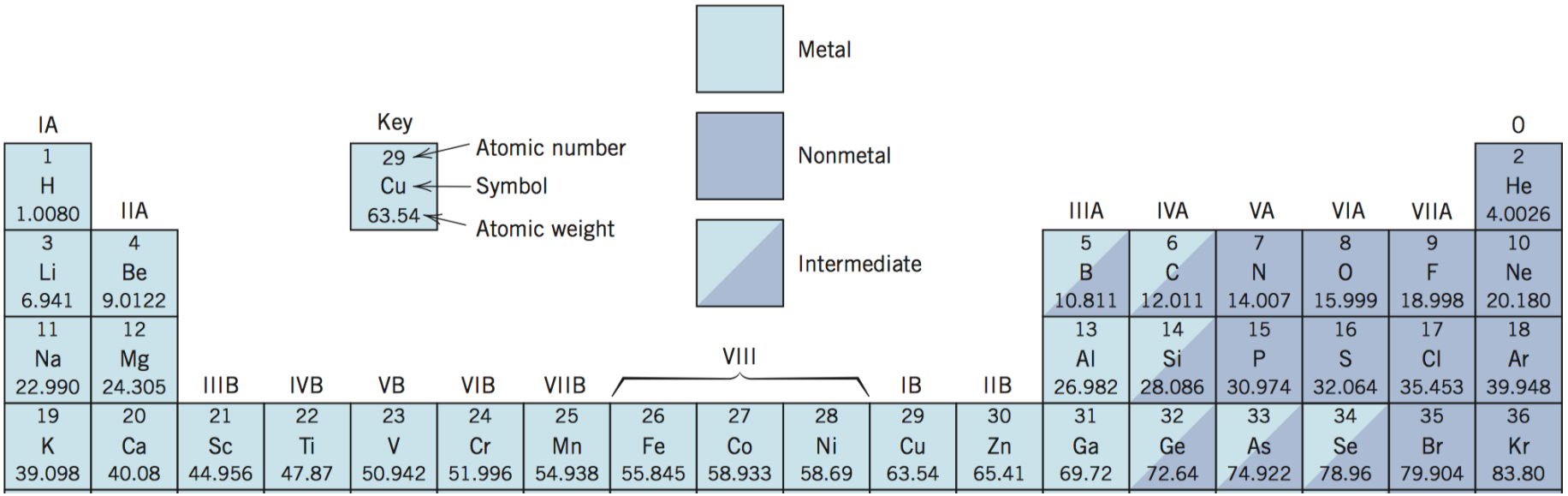




https://en.wikipedia.org/wiki/Hydrogen_atom

原子的结构

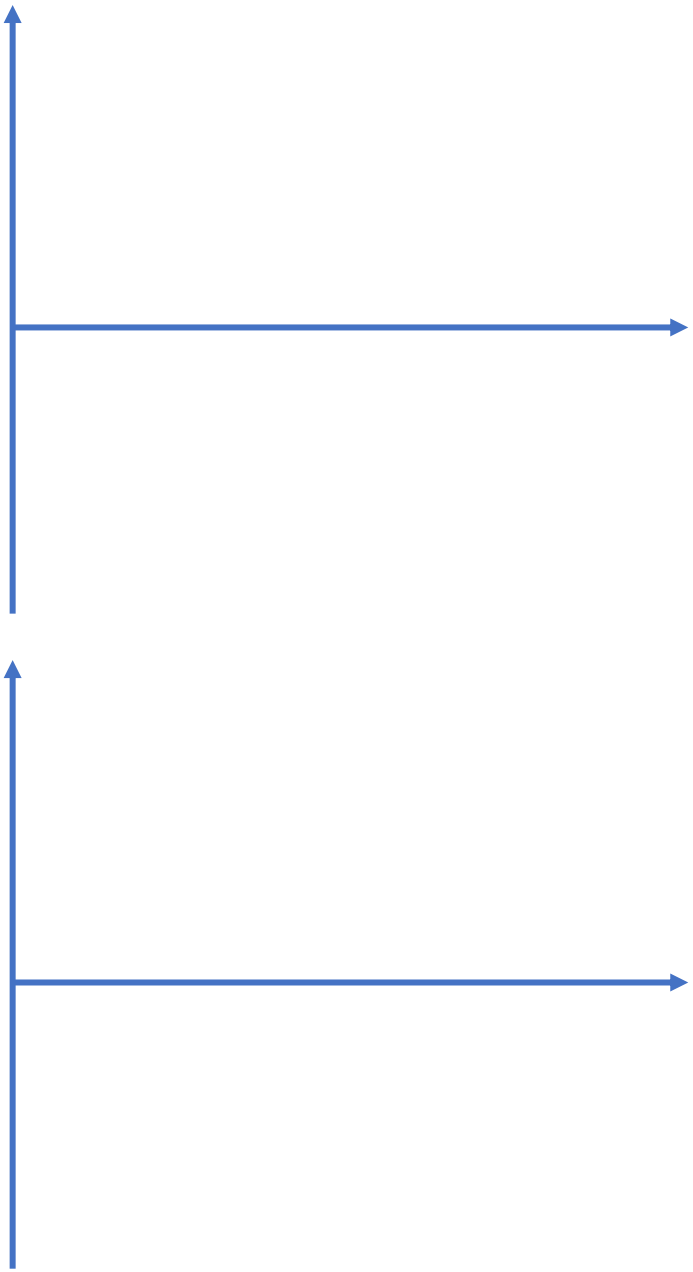
- 电子轨道


Metal
Nonmetal
Intermediate
Key
29
Cu
63.54
Atomic number
Symbol
Atomic weight
IA
IIA
IIIB
IVB
VB
VIB
VIIB
VIII
IB
IIB
IIIA
IVA
VA
VIA
VIIA
0
1 H 1.0080
2 He 4.0026
3 Li 6.941
4 Be 9.0122
5 B 10.811
6 C 12.011
7 N 14.007
8 O 15.999
9 F 18.998
10 Ne 20.180
11 Na 22.990
12 Mg 24.305
13 Al 26.982
14 Si 28.086
15 P 30.974
16 S 32.064
17 Cl 35.453
18 Ar 39.948
19 K 39.098
20 Ca 40.08
21 Sc 44.956
22 Ti 47.87
23 V 50.942
24 Cr 51.996
25 Mn 54.938
26 Fe 55.845
27 Co 58.933
28 Ni 58.69
29 Cu 63.54
30 Zn 65.41
31 Ga 69.72
32 Ge 72.64
33 As 74.922
34 Se 78.96
35 Br 79.904
36 Kr 83.80

原子间的力

- $F = F_A + F_R$

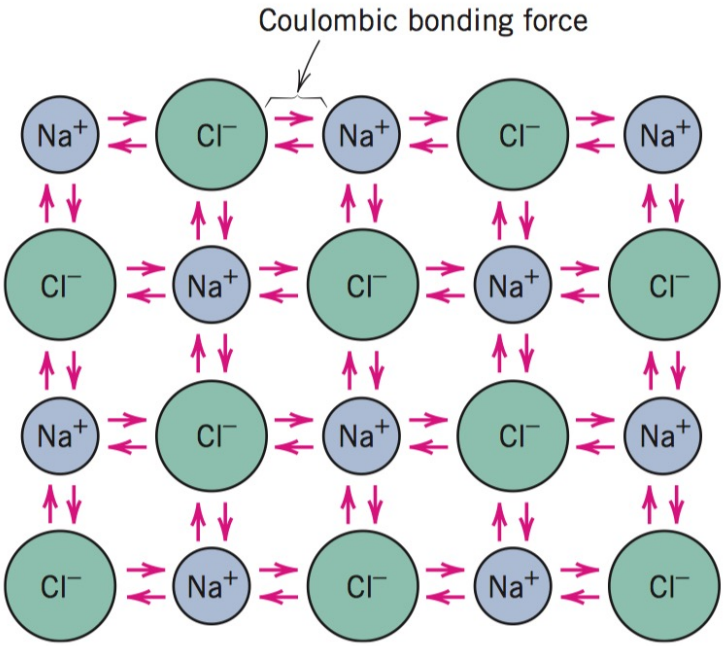
- $e = e_A + e_R$



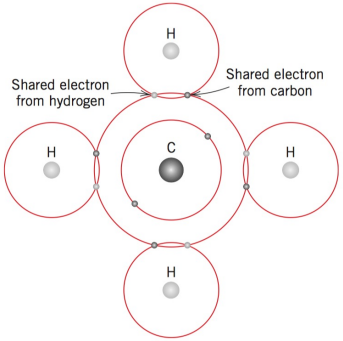
化学键（primary bonding）

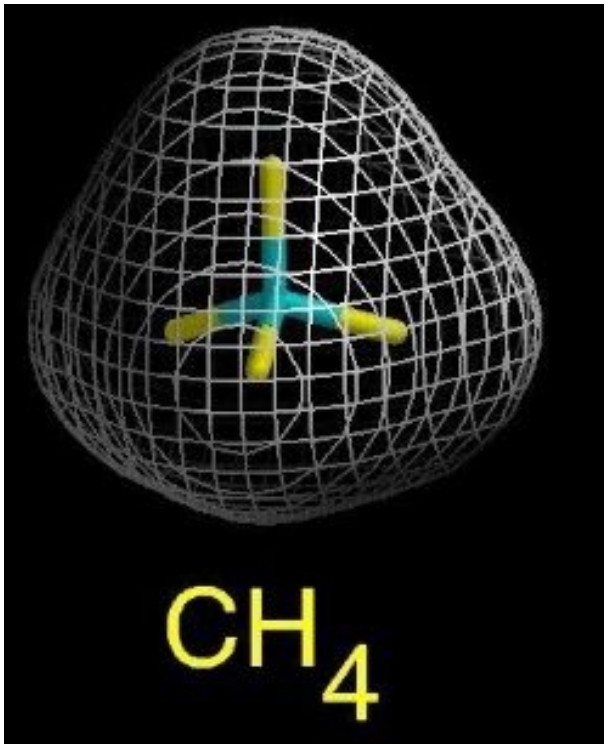
- 离子键（ionic bonding）
- 共价键（covalent bonding）
- 金属键（metallic bonding）

离子键（ionic bonding）

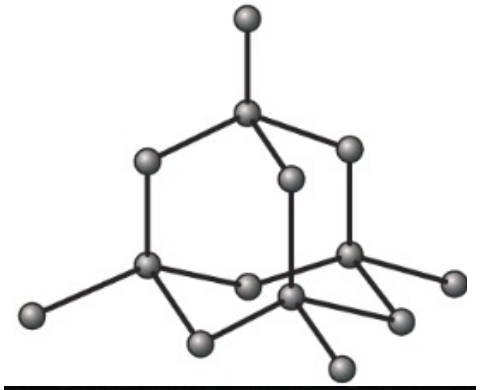


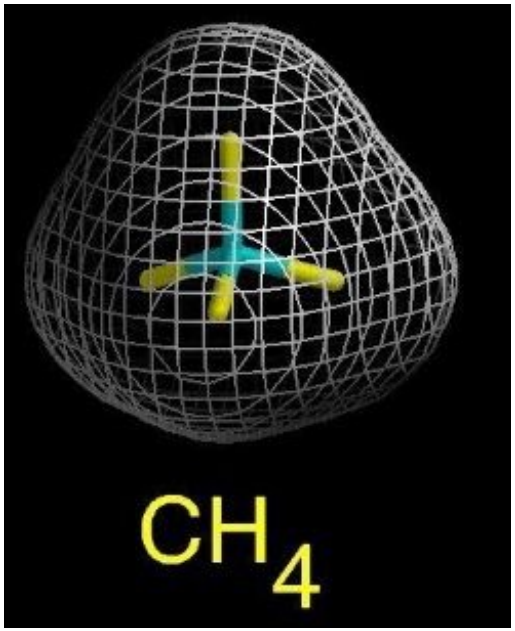
共价键（covalent bonding）

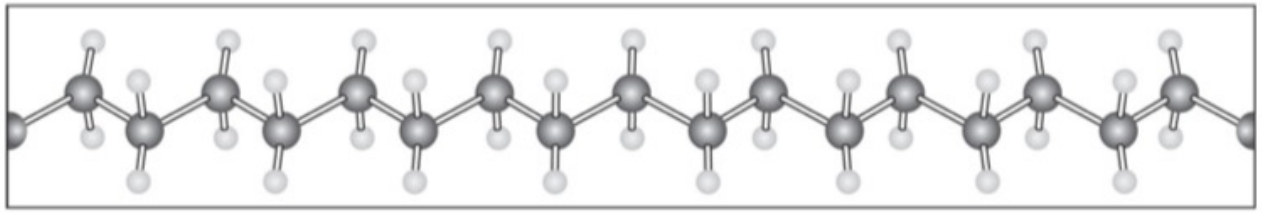




共价键（covalent bonding）





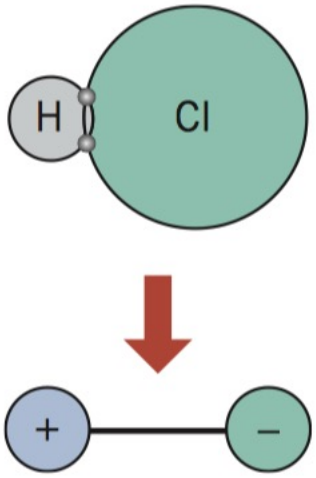


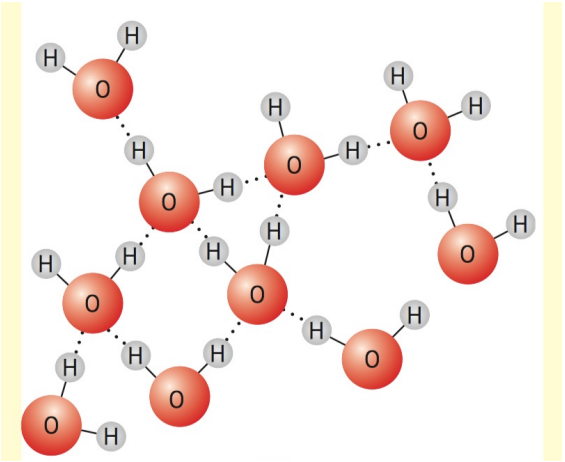
金属键（metallic bonding）

物理键（Secondary Bonding）

- 又称范德华键，比化学键要弱得多。

- 极化产生的范德华力





熔点与热膨胀

- $e = -\frac{A}{r^m} + \frac{B}{r^n}$

热膨胀

- $e = -\frac{A}{r^m} + \frac{B}{r^n}$

铝箔和塑料袋有啥不一样？

下一节课：晶向，晶面和点阵