Unit 2 - Atoms and Bonds

Sunday, January 29, 2017 10:40 AM

Atoms.

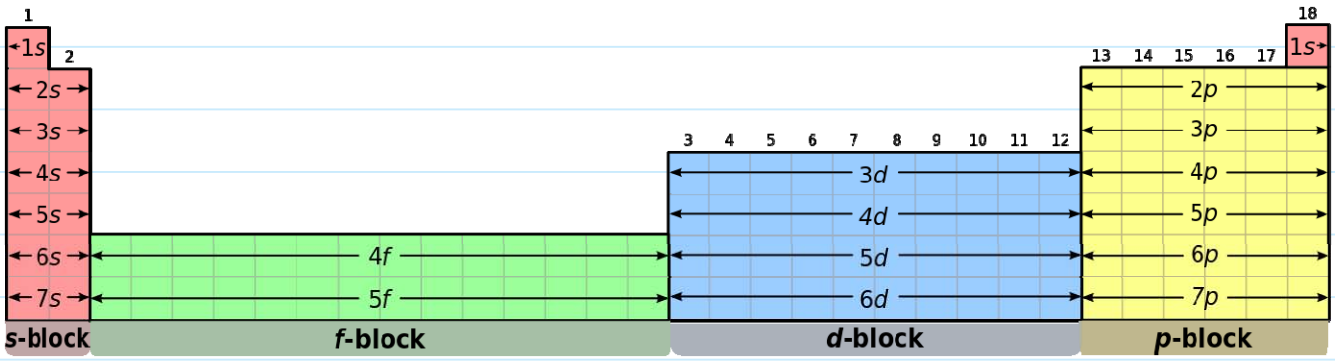
Unit of energy 1eV = 1.602×10^{-19} J

↑ energy gained accelerating electron through 1 volt.

Electron configuration

From <https://en.wikipedia.org/wiki/Electron_configuration>

Periodic Table
http://www.ptable.com/ http://www.ptable.com/#Orbital



Without consulting Figure 2.6 or Table 2.2, determine whether each of the electron configurations given below is an inert gas, a halogen, an alkali metal, an alkaline earth metal, or a transition metal. Justify your choices.

(a) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^7 4s^2$.

(b) $1s^2 2s^2 2p^6 3s^2 3p^6$.

(c) $1s^2 2s^2 2p^5$.

(d) $1s^2 2s^2 2p^6 3s^2$.

(e) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^2 4s^2$.

(f) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$.

P.39.34

Bonds.

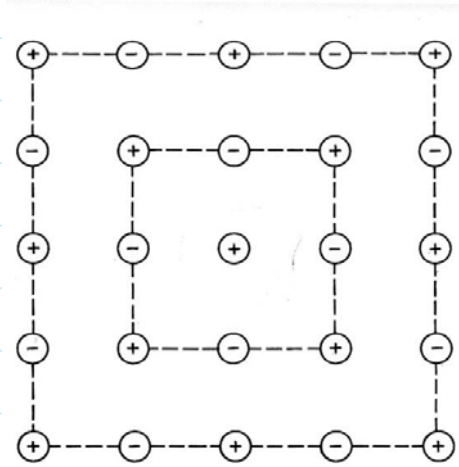
Ionic solids.

Madelung constant

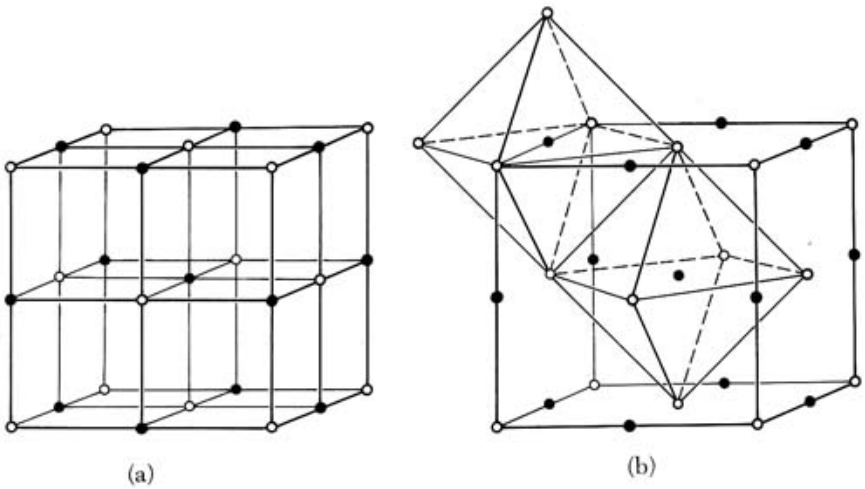
From <https://en.wikipedia.org/wiki/Madelung_constant>

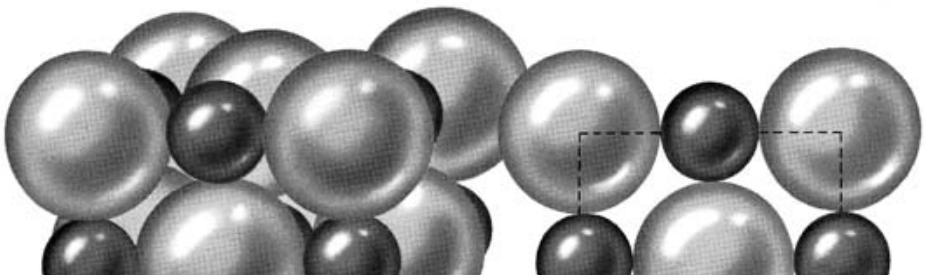
1D

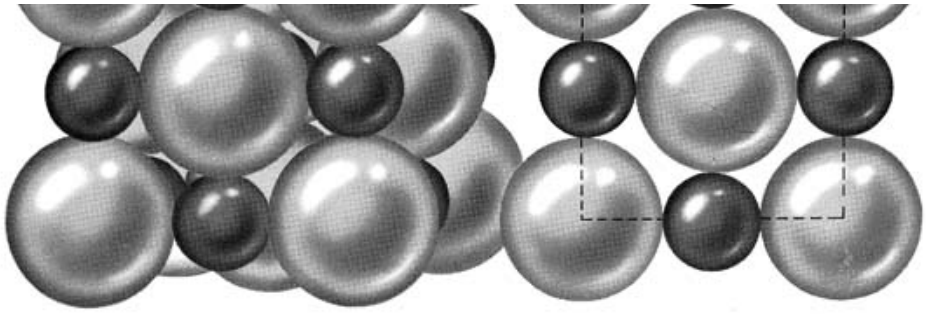
2D



3D







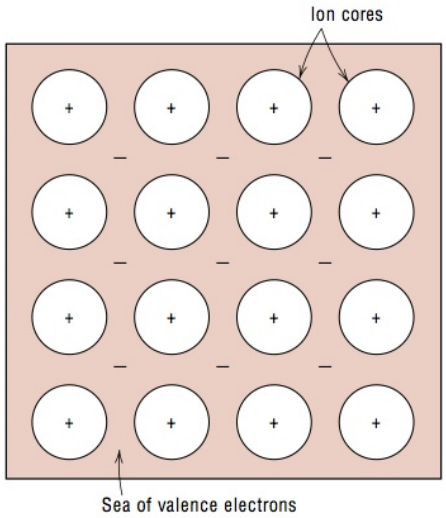
(c) (d)

Covalent solids.

Lewis structure

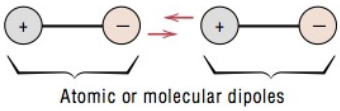
From <https://en.wikipedia.org/wiki/Lewis_structure>

Metalic Solids.

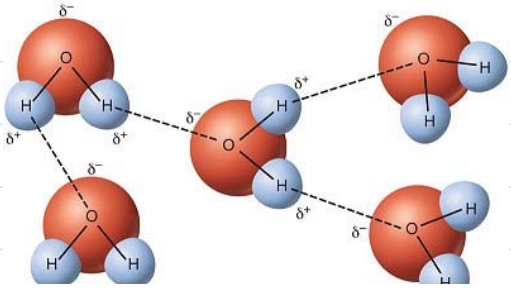


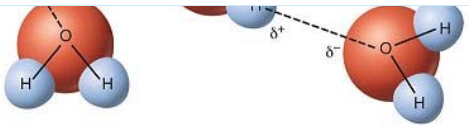
Secondary bonding.

pobr bonding.



hydrogen bonding





van der Waals bonding - induced dipole - induced dipole

Bond strengths & melting points.

Table 2.3 Bonding Energies and Melting Temperatures for Various Substances

Bonding Type	*Substance*	*Bonding Energy* *kJ/mol (kcal/mol)*	*Bonding Energy* *eV/Atom, Ion, Molecule*	*Melting Temperature (°C)*
Ionic	NaCl	640 (153)	3.3	801
	MgO	1000 (239)	5.2	2800
Covalent	Si	450 (108)	4.7	1410
	C (diamond)	713 (170)	7.4	>3550
Metallic	Hg	68 (16)	0.7	−39
	Al	324 (77)	3.4	660
	Fe	406 (97)	4.2	1538
	W	849 (203)	8.8	3410
van der Waals	Ar	7.7 (1.8)	0.08	−189
	Cl_2	31 (7.4)	0.32	−101
Hydrogen	NH_3	35 (8.4)	0.36	−78
	H_2O	51 (12.2)	0.52	0