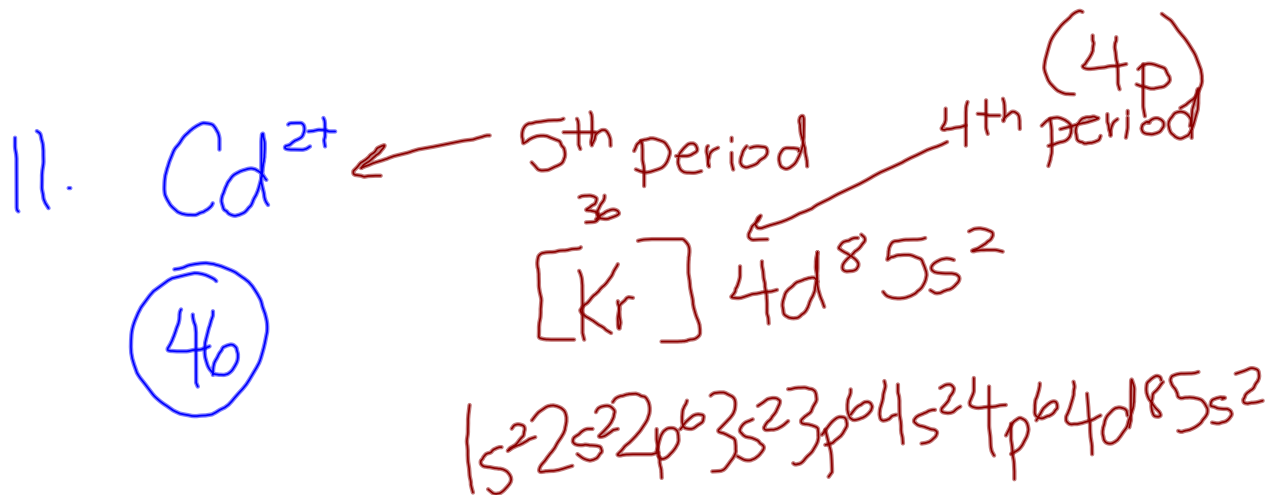
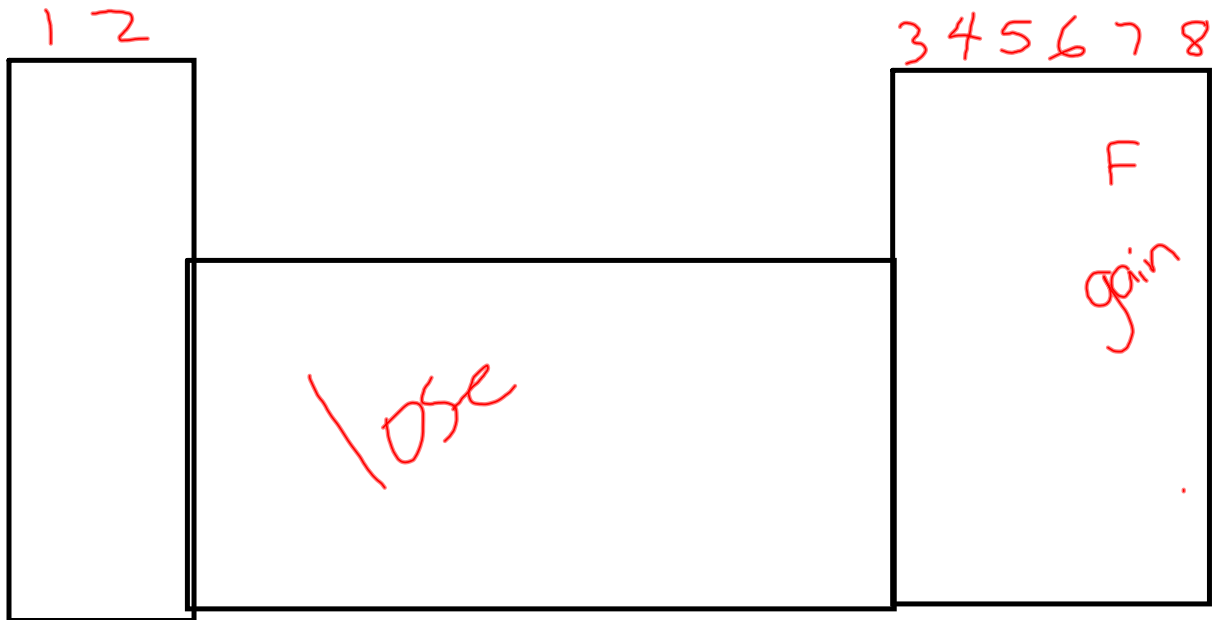


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Octet Rule

Valence electrons

Formation of cations

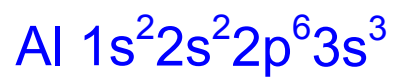
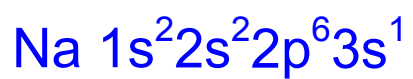


Formation of anions

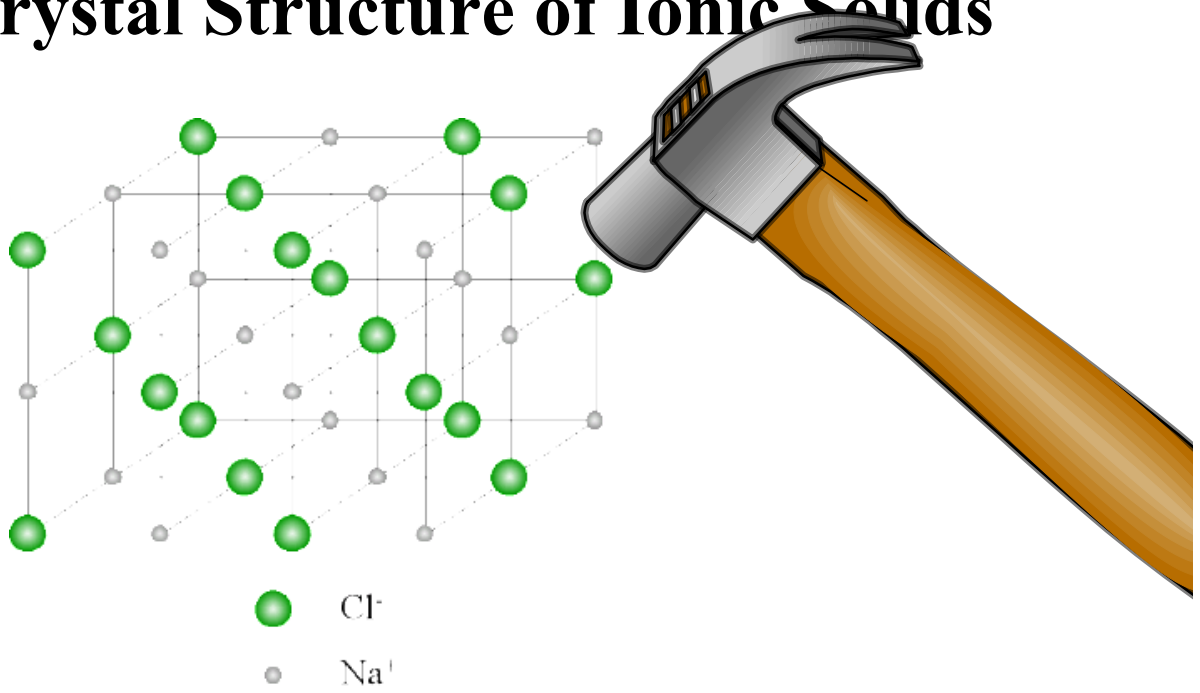


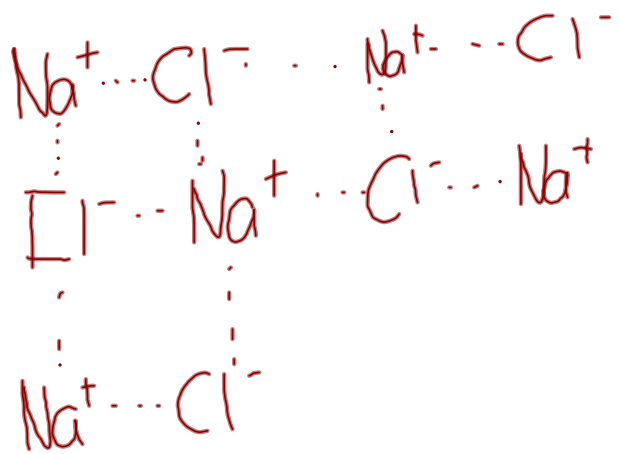
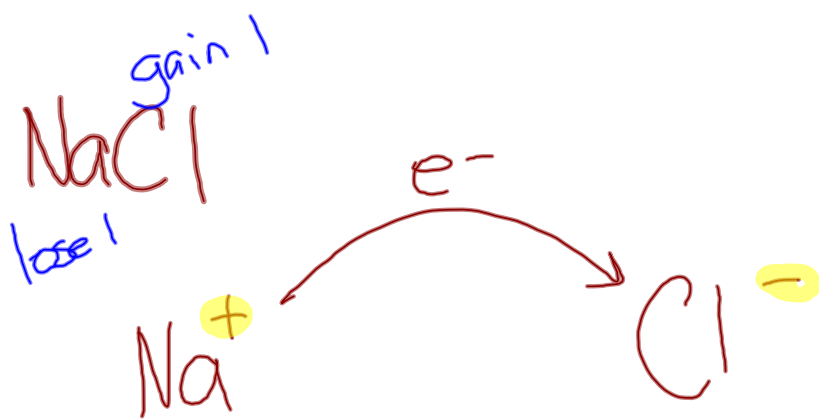
Table 7.1**Electron Dot Structure of Some Group A Elements**

Period	Group							
	1A	2A	3A	4A	5A	6A	7A	8A
1	H·							He·
2	Li·	Be·	B·	C·	N·	O·	F·	Ne·
3	Na·	Mg·	Al·	Si·	P·	S·	Cl·	Ar·
4	K·	Ca·	Ga·	Ge·	As·	Se·	Br·	Kr·



Crystal Structure of Ionic Solids





Metallic Bonds

Metals are made of closely packed cations rather than neutral atoms.

In metals, the valence electrons drift freely from one part of the metal to another.

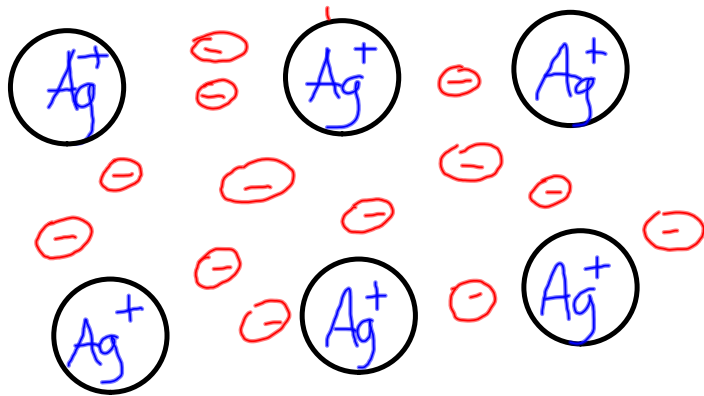
'sea of electrons'

Metallic bonds consist of the free-floating valence electrons for the positively charged metal ions.

Ductility and Malleability

Metals - cations insulated by 'sea' of electrons

Ionic compounds - positive ions pushed together and repel, causing crystal to shatter.

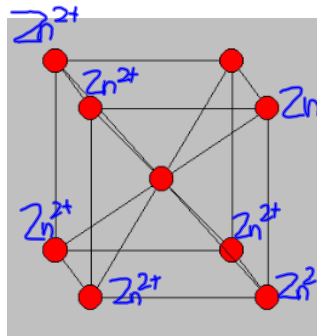


Crystalline Structure of Metals

Metals are arranged in very compact and orderly patterns.

Closely-Packed Arrangements:

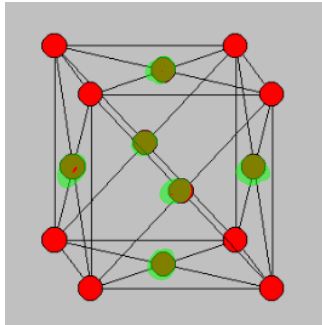
- Body-Centered Cubic



→ Cation on each corner (of cube)

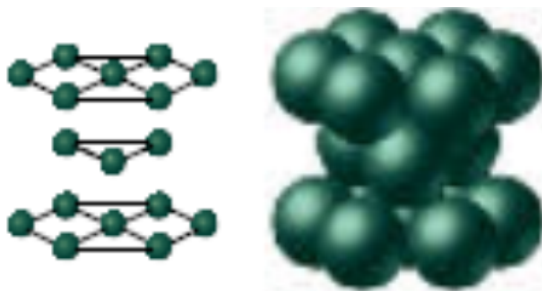
→ Cation in middle (of cube)

- Face-Centered Cubic



Corners → 8
Face → $\frac{6}{14}$

- Hexagonal Close-Packed



Hexagonal close-packed

Alloys

Alloys

Mixtures of two or more elements, at least one of which is a metal.

Table 7.3

Name	Composition (by mass)
Sterling silver	Ag 92.5%
	Cu 7.5%
Cast iron	Fe 96%
	C 4%
Stainless steel	Fe 80.6%
	Cr 18.0%
	C 0.4%
	Ni 1.0%
Spring steel	Fe 98.6%
	Cr 1.0%
	C 0.4%
Surgical steel	Fe 67%
	Cr 18%
	Ni 12%
	Mo 3%

Form in one of two ways:

1) Substitutional Alloys

If atoms of the alloy are about the same size, they can replace each other in the crystal.

2) Interstitial Alloys

If atomic sizes are quite different, smaller atoms can fit into the spaces between the larger atoms.