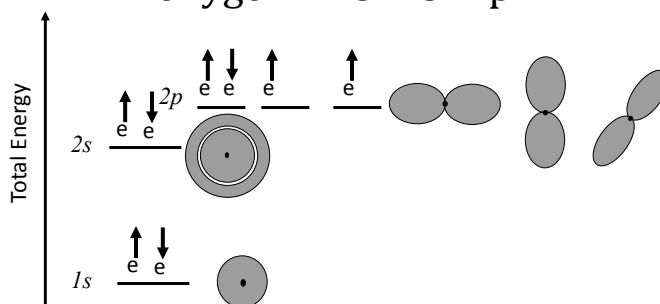


What is the electronic configuration of  $^{13}\text{Al}$ ?

- A)  $1s^2 2s^2 3s^2 4s^2 5s^2 6s^2 7s^1$   
 B)  $1s^2 2s^2 2p^2 3s^2 3p^2 3d^2 4s^2$   
 C)  $1s^2 2s^2 2p^6 3s^2 3p^1$   
 D)  $[\text{Ne}] 3s^2 3p^1$

Which are the valence electrons of  $^{13}\text{Al}$ ?

Oxygen =  $1s^2 2s^2 2p^4$



- a) Which are the valence electrons?  
 b) When is an atom excited?  
 c) What is ionization energy?  
 d) What is electron affinity?

# The Periodic Table

- Columns: Similar **Valence Structure**

I A		II A		III A										IV A										V A										VI A										VII A										VIII A																				
H	Li	Be	B	C	N	O	F	Ne	Na	Mg	Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe	Cs	Ba	Ra	Rf	Db	Sg	Bh	Hs	Mt	Ds	Fr	Ra	Rf	Db	Sg	Bh	Hs	Mt	Ds	Po	At	Rn

Legend:  Metal  
 Nonmetal  
 Intermediate

Electropositive elements: Readily give up electrons to become + ions.   
 Electronegative elements: Readily acquire electrons to become - ions.

Atomic number  $Z$

8	O
15.9994	

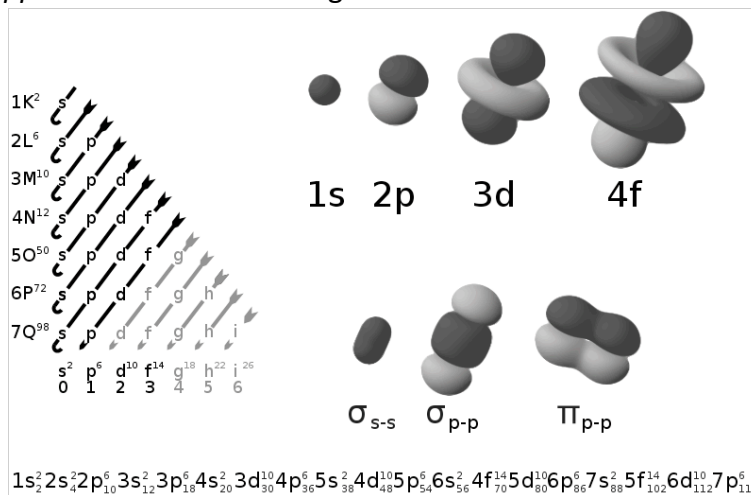
Atomic mass/weight  $M_{at}$

What is Avogadro's number  $N_A$ ?

What is a mole of a substance?

# 1.3 Bonding and types of solids

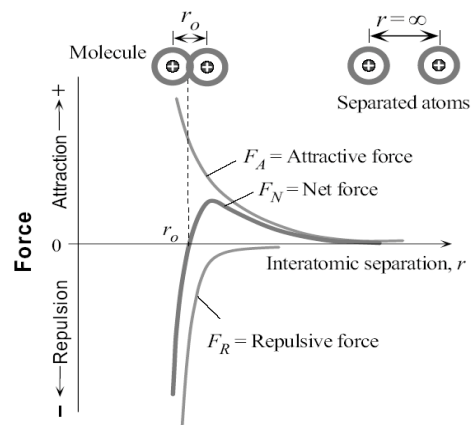
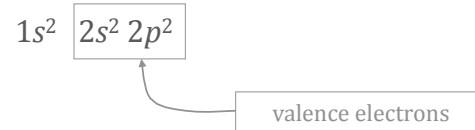
Approximate order of filling of atomic orbitals:



- How many valence electrons does carbon have?

C (atomic number = 6)

- A) 2
- B) 4
- C) 6
- D) None



(a) Force vs  $r$

$$F_{\text{net}} = F_{\text{attractive}} + F_{\text{repulsive}}$$

$$\text{Equilibrium: } F_{\text{net}} = 0$$

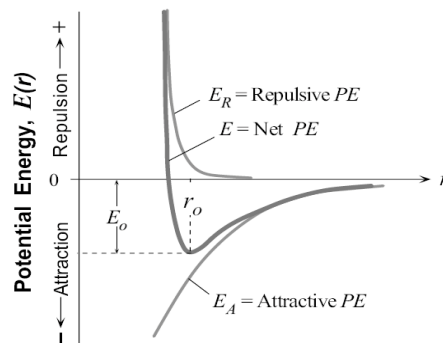
What is the relationship between force and (potential) energy?

A)  $PE = -\frac{\partial \vec{F}}{\partial \vec{r}}$

B)  $PE = -\int \vec{F} \cdot d\vec{r}$

C)  $PE = \frac{\partial^2 \vec{F}}{\partial \vec{r}^2}$

D) ????



(b) Potential energy vs  $r$

$$E = PE_{\text{net}} = PE_{\text{attractive}} + PE_{\text{repulsive}} \\ = E_A + E_R$$

How do we find the equilibrium separation?  
(i.e. the separation at which the energy is minimum?)

$$E = PE_{\text{net}} = E_A + E_R$$