

# Homework 2.1 (1)

What type(s) of bonding would be expected for each of the following materials:

- 1) Bronze (a copper-tin or Cu-Sn alloy);
- 2) Rubber;
- 3) Barium oxide (BaO);
- 4) Nylon;
- 5) Gallium arsenide (GaAs). You may refer to the electronegativity table below.

IA																0	
H 2.1	IIA										III A	IV A	V A	VIA	VII A	He -	
Li 1.0	Be 1.5											B 2.0	C 2.5	N 3.0	O 3.5	F 4.0	Ne -
Na 0.9	Mg 1.2	IIIB	IVB	VB	VIB	VIIB	VIII			IB	IIB	Al 1.5	Si 1.8	P 2.1	S 2.5	Cl 3.0	Ar -
K 0.8	Ca 1.0	Sc 1.3	Ti 1.5	V 1.6	Cr 1.6	Mn 1.5	Fe 1.8	Co 1.8	Ni 1.8	Cu 1.9	Zn 1.6	Ga 1.6	Ge 1.8	As 2.0	Se 2.4	Br 2.8	Kr -
Rb 0.8	Sr 1.0	Y 1.2	Zr 1.4	Nb 1.6	Mo 1.8	Tc 1.9	Ru 2.2	Rh 2.2	Pd 2.2	Ag 1.9	Cd 1.7	In 1.7	Sn 1.8	Sb 1.9	Te 2.1	I 2.5	Xe -
Cs 0.7	Ba 0.9	La-Lu 1.1-1.2	Hf 1.3	Ta 1.5	W 1.7	Re 1.9	Os 2.2	Ir 2.2	Pt 2.2	Au 2.4	Hg 1.9	Tl 1.8	Pb 1.8	Bi 1.9	Po 2.0	At 2.2	Rn -
Fr 0.7	Ra 0.9	Ac-No 1.1-1.7															

# Homework 2.1 (1)

1. Bronze or Cu-Sn alloy:

both Cu and Sn are metals → **Metallic bond**

2. Rubber:

A rubber is a polymer material containing primarily C, H, and O elements →

- **Covalent bond WITHIN a single molecule**
- **Secondary bond BETWEEN different molecules**

3. BaO:

Ba electronegativity = 0.9; O electronegativity = 3.5;

Very large difference in electronegativity → **Ionic bond**

4. Nylon:

A nylon is a polymer material containing primarily C, H, and O elements →

- **Covalent bond WITHIN a single molecule**
- **Secondary bond BETWEEN different molecules**

5. GaAs:

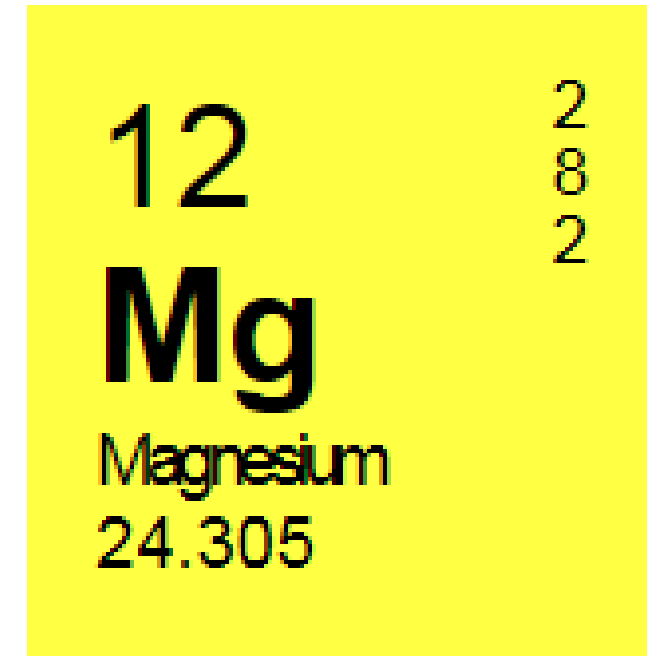
Gallium electronegativity = 1.6; Arsenide electronegativity = 2.0

Very small difference in electronegativity → **Covalent bond**

# Homework 2.2 (1)

Given information on right from the periodic table for magnesium (Mg),

- What is the atomic number  $Z$  ?  $Z = 12$
- What is the number of proton in Mg nucleus ?
- What is the atomic weight  $A$  and the unit for atomic weight  $A$  ?
- On average, one gram of Mg will contain how many Mg atoms?
- What is the average (over naturally occurring isotope) mass for one magnesium atom?
- Knowing F has electron configuration of  $1s^2 2s^2 2p^5$  and atomic weight of 19.0, give the chemical formula for the stable compounds between Mg and F and calculate the mass for one mole of that compound.



12	2 8 2
<b>Mg</b>	
Magnesium	
24.305	

## Homework 2.2 (2)

- Atomic number for Mg  $Z = 12$
- Number of protons in nucleus of Mg atom =  $Z = 12$
- Atomic mass for Mg  $A_{\text{Mg}} = 24.305 \text{ g/mol}$
- On average, 1 g of Mg is ? Mole of Mg? 1 mole is ? atoms?

$$\left(\frac{1\text{g}}{24.305\frac{\text{g}}{\text{mol}}}\right) \times \left(6.02 \times 10^{23} \frac{1}{\text{mol}}\right) = \mathbf{2.48 \times 10^{22}} \text{ Mg atoms}$$

12	2
Mg	8
Magnesium	2
24.305	

- F has electron structure of  $1s^2 2s^2 2p^5$ , meaning it has a total of ? electrons in the outer shell and need only ? electron to be stable.

Meanwhile, Mg has ? outer shell electrons to give out.

Therefore, one Mg atom wants to combine with ?? F atom, i.e., the stable compound between Mg and F will be **MgF<sub>2</sub>**

From periodic table, F atomic mass = ? g/mol (check periodic table)

Mass for **one mole of MgF<sub>2</sub>** is  $A_{\text{Mg}} + ? A_{\text{F}} = ? \text{ g/mol} + ? \times ? \text{ g/mol} = \mathbf{62.30 \text{ g}}$