

## PERIODIC LAW

Chemical properties of an element depend on the number and the configuration of their (valence) electrons. According this all the elements are sorted into 4 blocks: s, p, d, f elements.

### Properties of elements

3<sup>rd</sup> period elements: Na Mg Al Si<sup>IV</sup> P S Cl  
-IV

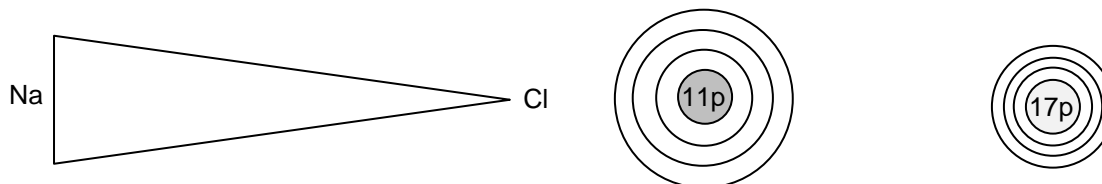
**Oxidation numbers:** The highest possible oxidation number responds to the number of the group.  
The lowest negative oxidation number = number of the group – 8.

1. Give the highest possible positive and the negative oxidation number for the 3<sup>th</sup> period elements.

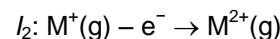
### Atomic radius:

Atomic radius ..... going down the group because of the increasing number of the .....

Atomic radius ..... across the period as the electrons are attracted by more positive protons.



**Ionization energy:** energy required for removing an electron from an atom:  $I_1: M(g) - e^- \rightarrow M^+(g)$



Ionization energy ..... going down the group because the valence electrons are ..... from the nucleus and the attractive forces are .....

Ionization energy ..... across the period. As the valence electron of chlorine is attracted by more protons and it is ..... to the nucleus, it is *more difficult/easier* to remove it compared to the valence electron of sodium.

**Electron affinity:** energy liberated when an atom accepts an electron  $EA: A(g) + e^- \rightarrow A^-(g)$

Electron affinity ..... going down the group because the last shell is ..... from the nucleus and the attractive forces are .....

Electron affinity ..... across the period. As the diameter of chlorine is ..... than that of sodium the last shell is ..... to the nucleus and the attractive forces are .....

**Electronegativity:** ability of an atom to hold the bonding electrons. Its value is calculated from the values of ionization energy and electron affinity. The higher ionization energy the .....

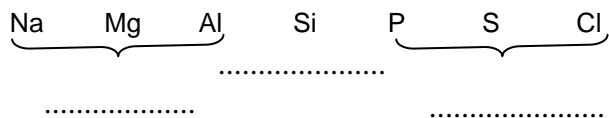
electronegativity. Electronegativity ..... from sodium to chlorine and ..... going down the group.



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### Metallic × non-metallic properties

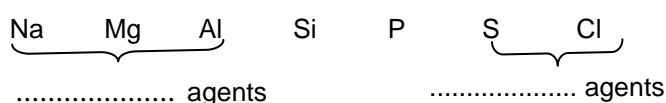
Elements with low *I* are typical ....., those with high *I* are typical .....



### Redox properties

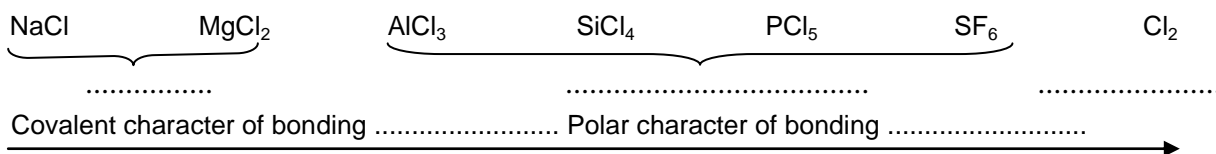
Elements with a low value of ionization energy (metals) easily ..... electrons, they are good ..... agents.

Elements with a high value of ionization energy (non-metals) easily ..... electrons, they are good ..... agents.

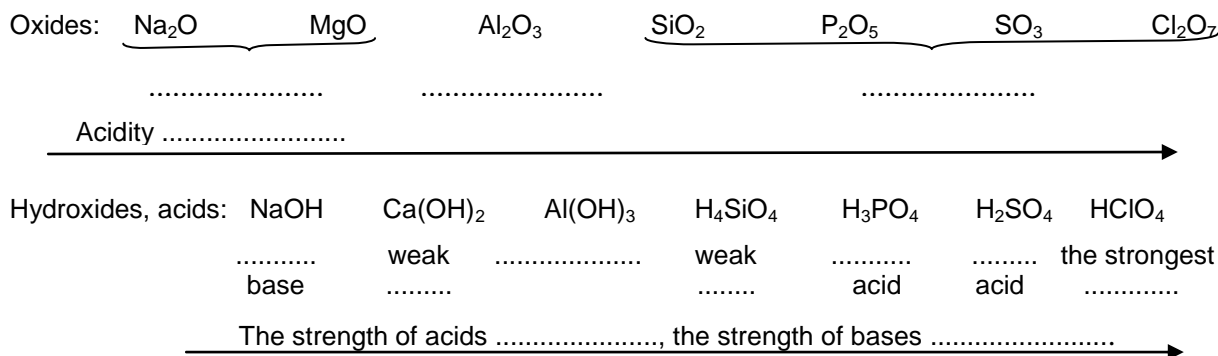


### Properties of compounds

#### Type of bonding in halides (chlorides)



### Acid – base properties



2. Where in the periodic table would you find elements with the following properties?

Basic		Reducing agents
Non-metals		Oxidizing agents
Metals		High electron affinity
Acidic		Low ionization energy
Low electronegativity		High electronegativity