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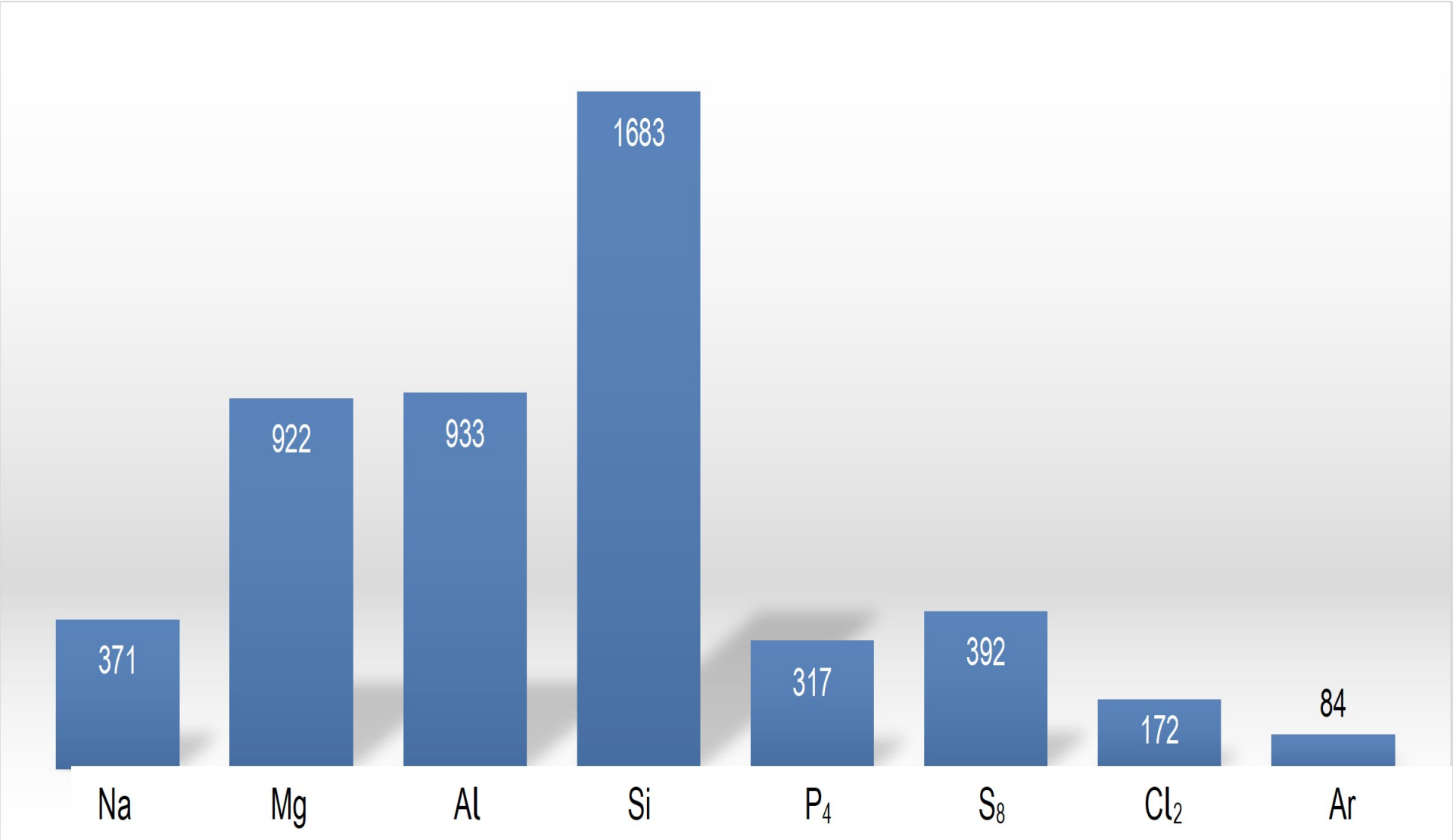
PERIOD 3 ELEMENTS
Physical Properties

MELTING POINTS

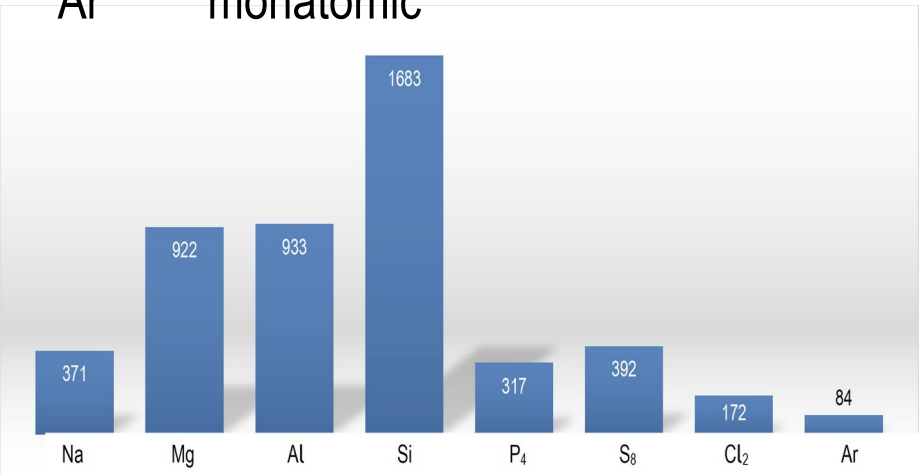


values in K

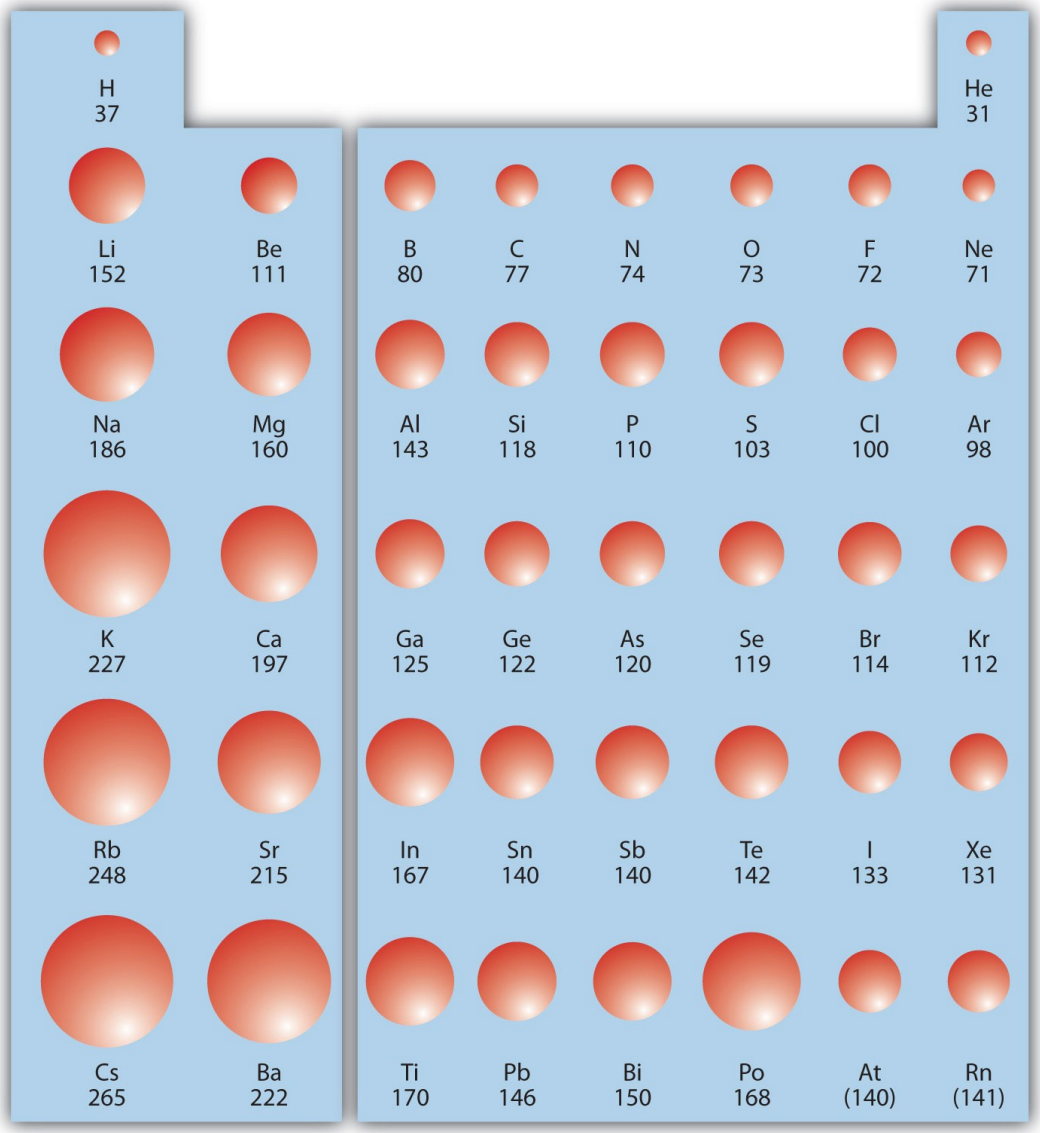
MELTING POINTS

Na	metallic
Mg	metallic
Al	metallic
Si	giant covalent
P_4	simple molecular
S_8	simple molecular
Cl_2	simple molecular
Ar	monatomic

- high due to strong attraction between + nuclei of atoms and cloud of – delocalized outer shell electrons
- from Na to Al, mpt rises as metallic bonding gets stronger due to
  - more protons
  - smaller atoms
  - more delocalized electrons per atom
- very high mpt as need to break many, strong covalent bonds
- weak van der Waals' forces between molecules so low mpt
- $S_8 > P_4 > Cl_2$ (bigger molecules, more electrons, more vdW)
- very weak van der Waals' forces between atoms so lowest mpt

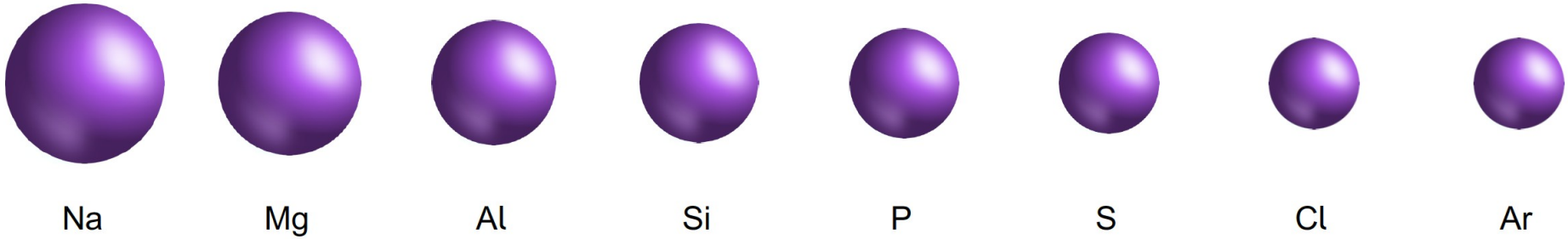


ATOMIC RADIUS



From: http://2012books.lardbucket.org/books/beginning-chemistry/s12-05-periodic-trends.html

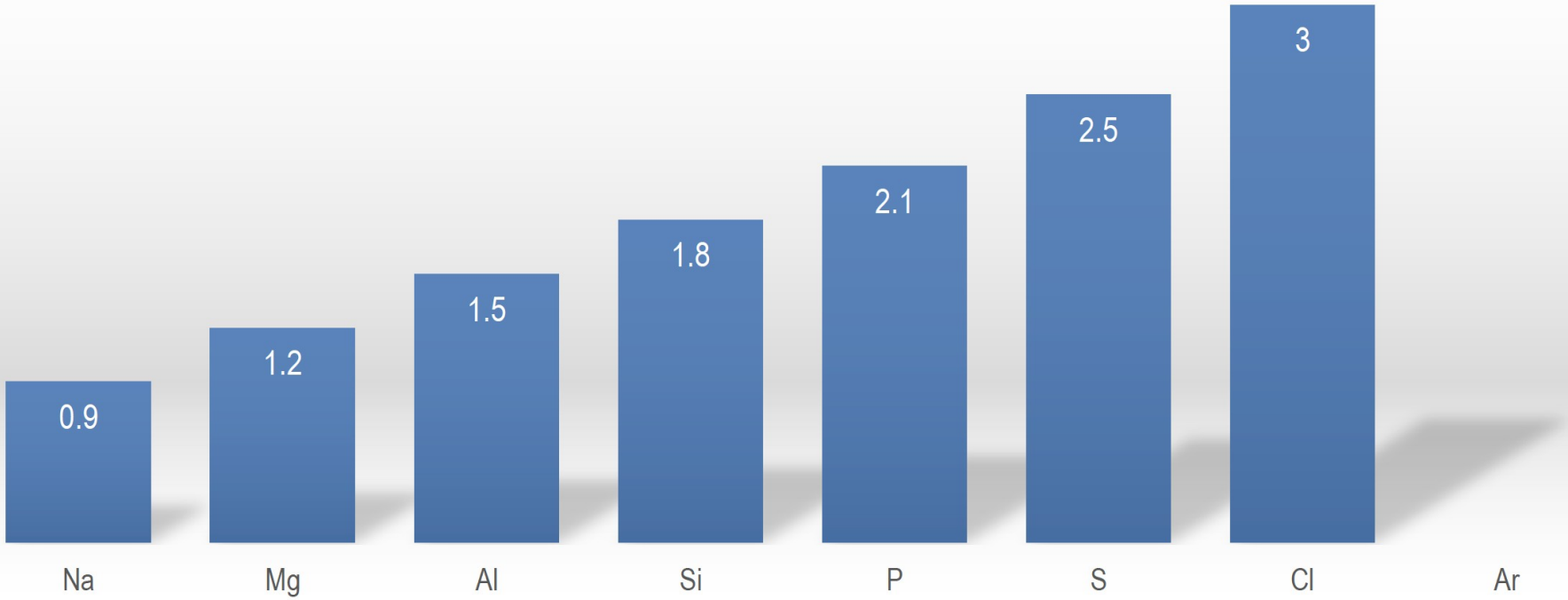
ATOMIC RADIUS



Across the period atoms get smaller as

- electrons in same main shell (shell 3)
- with the same amount of shielding
- but more protons in the nucleus
- and so the electrons are pulled in closer to the nucleus

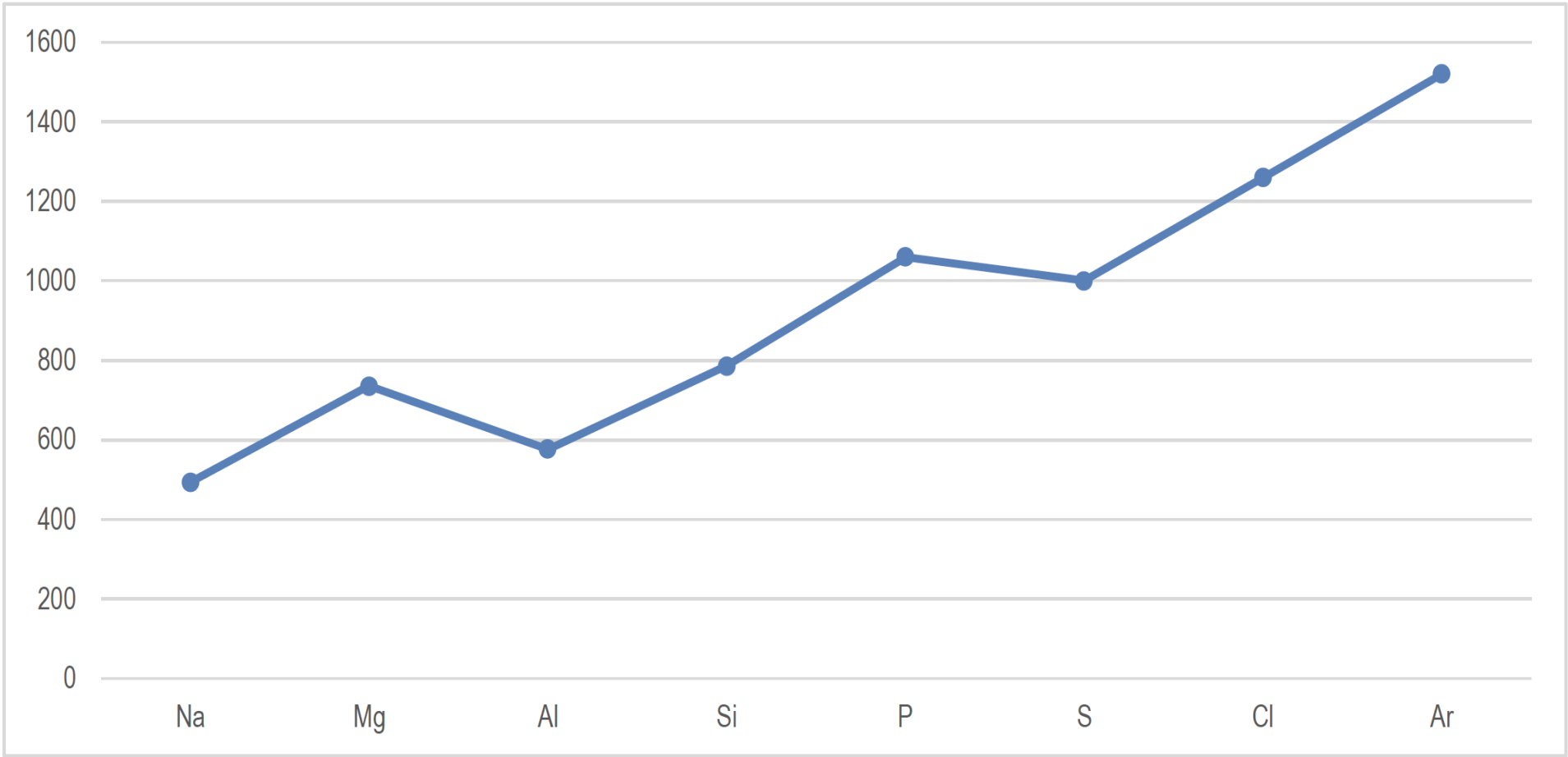
ELECTRONEGATIVITY



Across the period electronegativity increases as:

- smaller atomic radius
- more protons
- and so stronger attraction between nucleus and the **two** electrons in a covalent bond

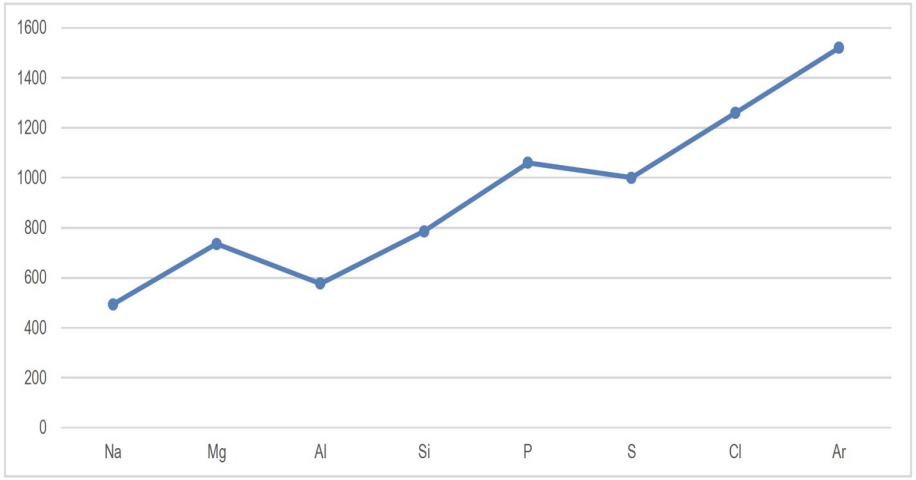
1st IONISATION ENERGY



1st IONISATION ENERGY

General trend

- smaller atomic radius
- more protons
- stronger attraction between nucleus and outer electron



Dip from Group 2 to 3 (Mg to Al)

- Mg loses electron from 3s orbital
- Al loses electron from 3p orbital
- 3p is higher energy than 3s

Dip from Group 5 to 6 (P to S)

- P loses electron from an orbital containing one electron
- S loses electron from an orbital containing two electrons
- greater electron-electron repulsion in S