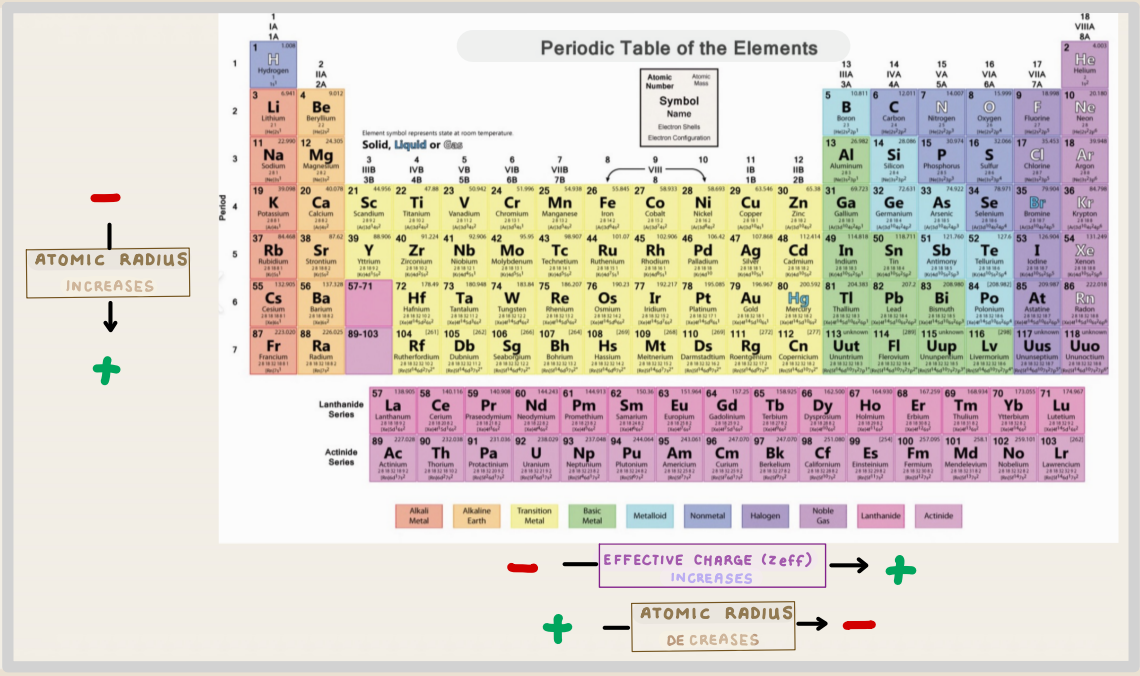
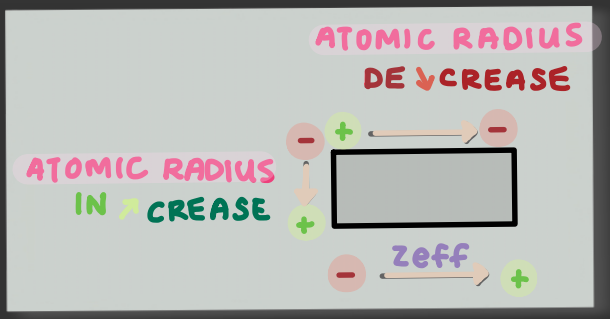



## EFFECTIVE CHARGE

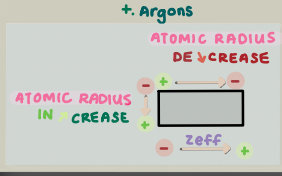
→ FIND $Z_{EFF} = Z - \sigma$

$Z$: NUCLEAR CHARGE; $\sigma$: SCREENING CONSTANT




## LARGEST RADIUS

- LARGEST ATOMIC RADIUS
  - SMALLEST zeff
  - ANION (−)
    - +. Argons

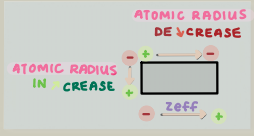



ANION (−) = ATOMIC # (Z) + CHARGE

ADD CHARGE B/C OF POS. CHARGE

## SMALLEST RADIUS

- SMALLEST ATOMIC RADIUS
  - −LARGEST zeff
  - −CATION (+)
    - +. NEONS



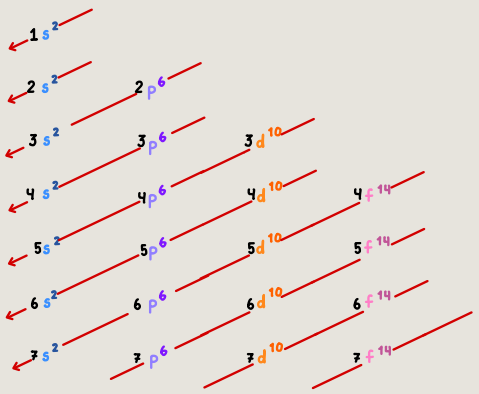

CATION (+) = ATOMIC # (Z) − CHARGE

MINUS CHARGE B/C OF POS. CHARGE

# QUANTUM NUMBERS

- **n - VALUE: SHELLS** — PRINCIPAL QUANTUM NUMBER
  - number of electronic layer
- **ℓ - VALUE: SUBSHELLS** — SECONDARY QUANTUM NUMBER
  - B/w 0 and n-1
  - S ORBITAL : ℓ = 0 → 0
  - P ORBITAL : ℓ = 1 → +1 0 -1
  - D ORBITAL : ℓ = 2 → +2 +1 0 -1 -2
  - F ORBITAL : ℓ = 3
- **mℓ - VALUE: ORBITALS** — MAGNETIC QUANTUM NUMBER
  - mℓ = ℓ - VALUE (2) + 1
  - $-\ell \rightarrow +\ell$
- **S - VALUE: SPIN** — SPIN #
  - $+1/2, -1/2$

# ORDER OF FILLING




ORDER OF FILLING : $[1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^2, 3d^{10}, 4p^6, 5s^2, 4d^{10}, 5p^6, 6s^2, 4f^{14}, 5d^{10}, 6p^6, 7s^2, 5f^{14}]$

| Orbital | *s* | *p* | *d* | *f* |
|---|---|---|---|---|
| Quantity of orbitals | 1 | 3 | 5 | 7 |
| Maximum number of electrons they can hold (2 electrons per orbital) | 2 | 6 | 10 | 14 |

even if the ns ORBITAL before (n-1)d ORBITAL, when a transition metal forms a CATION,

→ it is the ns orbital that empties first:

- ns and (n-1)d orbitals are very close in energy, and the electron-electron and electron-nucleus interactions change when going from atom → cation

∴ causing a change in energetic order b/w ns and (n-1)d orbitals