13. Chlorine has the electron configuration $1s^22s^22p^63s^23p^7$.

D. Sturman BHS

PERIODIC TRENDS: What's going on???

Define Periodic Trend: properties of elements change in a predictable way down + across the periodic table.

I. ATOMIC RADII

Definition: ½ the distance between the nuclei of 2 indentical elements when joined.

Refer to p 2 in packet or p 170 in text.

1. What happens to the atomic radius across a period from left to right? Decreases

2. What happens to the atomic radius down a group? Increases

Let's understand these trends. Answering the following questions should help.

3. a) How does atomic number change across a period? Increases

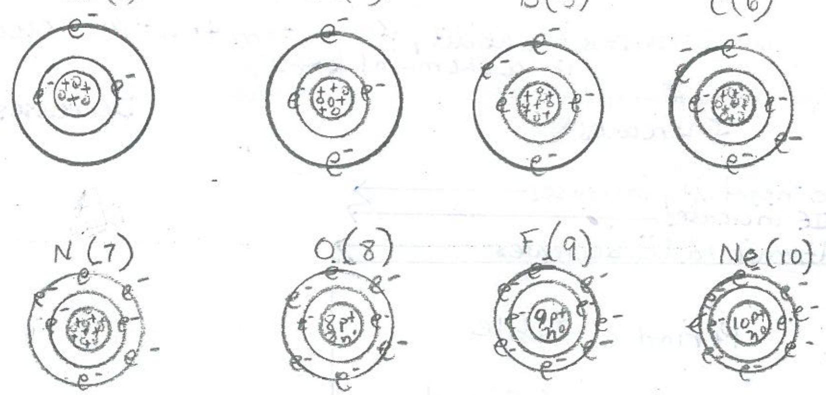
b) Therefore the number of protons increases or decreases? Increases.

c) Therefore the number of electrons increases or decreases? Increases.

d) What type of electromagnetic force exists between protons & electrons, attractive or repulsive? repulsive

e) Based on the above answers, explain why the atomic radii decrease from left to right? Atomic radius ↓ from left to right since # p^+ ↑ + # e^- ↑ while the energy level stays the same. This causes a stronger electric force of attraction which draws e^- in closer to the nucleus.

f) Draw Bohr models of each period 2 element, showing the trend we analyzed above.



(AP) ← inner e^- not as effective in shielding the additional val e^- from the ↑ nuclear charge.

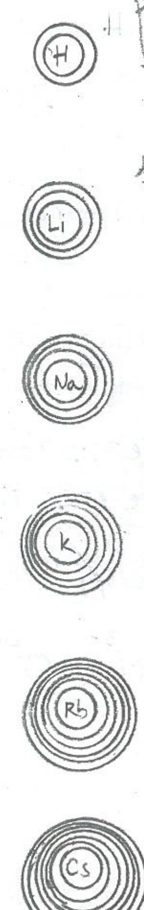
4. a) What happens to the principal quantum number (also know as energy level) down a group? Increases

b) Are electrons in higher energy levels closer or further away from the nucleus? Further

c) Based on your answers in a & b, why do the atomic radii increase from top to bottom? There are more energy levels (like layers) ∴ e^- further away from the nucleus.

d) Draw Bohr models for each of the alkali metals showing the trend we analyzed above. You do not need to draw all the protons, neutrons, or electrons ~~for potassium, rubidium, cesium, or francium, just show the energy levels for these~~. just show the energy levels.

(AP) Brown p. 264 → ★ $F_e = k\frac{qq'}{r^2}$ (Coulomb's law)



* Says as charge ↑ F_e ↑; If # p^+ ↑ + # e^- ↑ then stronger attractive force. But # e^- ↑ the e^- repel each other as well.

→ WHAT TO DO?

Look at net electric force on each e^-:

Z_{eff} = effective nuclear charge

$= Z - S$

Z = # p^+ (nuclear charge)

S = Screening Constant

→ portion of nuclear charge that is screened from the valence e^- by the inner e^-.

$S \approx$ # e^- "inner core" of atom.

e^- in same valence shell hardly screen one another.

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