Exercise 2 — 11 pts

$^{35}_{17}Cl$, $^{63,5}_{29}Cu$, $^{79}_{35}Br$, $^{108}_{47}Ag$, $^{85,5}_{37}Rb$

1 - Determine the number of proton, neutron and electron of each element:

(3)

		protons	Neutrons	electrons
$^{35}_{17}Cl$	—	17	18	17
$^{63,5}_{29}Cu$	—	29	34,5	29
$^{79}_{35}Br$	—	35	44	35
$^{108}_{47}Ag$	—	47	61	47
$^{85,5}_{37}Rb$	—	37	48,5	37

2/ the electronic configuration :

0,25 $^{35}_{17}Cl$: $1s^2 2s^2 2p^6 / 3s^2 3p^5$

0,25 $^{63,5}_{29}Cu$: $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^9$
$/ 4s^1 3d^{10}$

0,25 $^{79}_{35}Br$: $1s^2 2s^2 2p^6 3s^2 3p^6 / 4s^2 3d^{10} 4p^5$

0,25 $^{108}_{47}Ag$: $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6$
$/ 5s^1 4d^{10}$

0,25 $^{85,5}_{37}Rb$: $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 / 5s^1$

3/ Place the elements in the periodic table :

$_{17}Cl$: period = 3 (0,75)
group = VII A
block : p

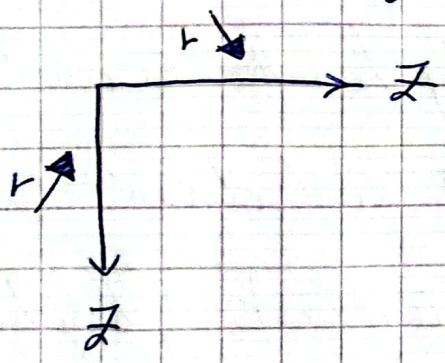
$_{47}Ag$: period = 5 (0,75)
group = I B
block : d

$_{29}Cu$: period = 4 (0,75)
group = I B
block : d

$_{37}Rb$: period = 5 (0,75)
group = I A
block : s

$_{35}Br$: period = 4 (0,75)
group = VII A
block : p

4/ Classify these elements in ascending order of atomic radius :



- in the same period :

$r_{Ag} < r_{Rb}$

$r_{Br} < r_{Cu}$

- in the same column :

$r_{Cl} < r_{Br}$

$r_{Cu} < r_{Ag}$

(1) So : $r_{Cl} < r_{Br} < r_{Cu} < r_{Ag} < r_{Rb}$

5/ Lewis structure of SiF_2 (0,25)

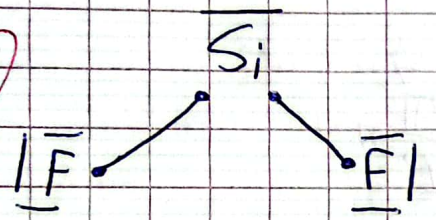
(0,25) $_{14}Si$: $1s^2 2s^2 2p^6 / 3s^2 3p^2$ (0,25) $\overline{Si}$.

↿⇂	↿	↿	

(0,25) $_9F$: $1s^2 / 2s^2 2p^5$ (0,25) $|\overline{F}|$

↿⇂	↿⇂	↿⇂	↿

(0,5)



AX_2E_1 : in V

6/ The molecule NCl_5 does not exist because the nitrogen it only has the "s" and "p" orbitals of the layer n=2 and doesn't contain "d" orbital; In contrast, phosphorus belongs to the third period and has the "3d" orbital. (0,5)

Exercise 3 06 pts

He gas $Z = 2$

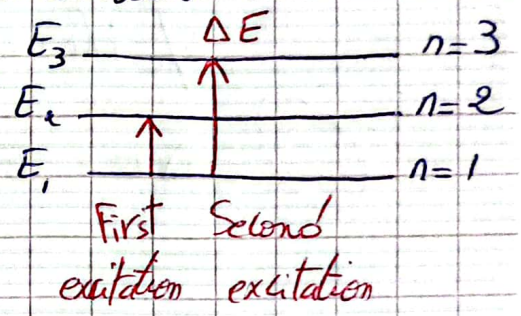
(0,25) The hydrogenoïd obtained is : $_2He^+$

because the number of electron is Z - charge

$= 2 - 1$ (0,25)

$= 1$

1/ The energy of the second excitation :



second excitation :

(0,25) $n_1 = 1 \longrightarrow n_2 = 3$

(0,5) $E_n = -13,6 \cdot \frac{Z^2}{n^2}$

$\Delta E = E_3 - E_1$

(0,25) $E_3 = -13,6 \cdot \frac{Z^2}{3^2}$ | $E_1 = -13,6 \cdot \frac{Z^2}{1^2}$ (0,25)

$= -13,6 \cdot \frac{2^2}{3^2}$ | $= -13,6 \cdot \frac{2^2}{1^2}$

(0,25) $E_3 = -6,04$ eV | $E_1 = -54,4$ eV (0,25)

(0,25) $\Delta E = E_3 - E_1$

$= -6,04 + 54,4$ $\Delta E = 48,36$ eV

(0,5)

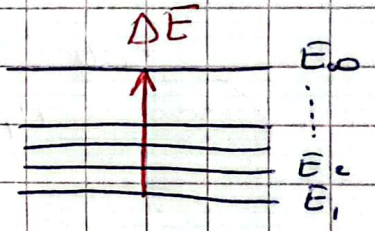
2/ the corresponding wave length : λ

(0,5) $\Delta E = h\nu = h\frac{c}{\lambda} \Rightarrow \lambda = \frac{hc}{\Delta E}$

(0,25) $\lambda = \frac{6,62 \cdot 10^{-34} \cdot 3 \cdot 10^{8}}{48,36 \cdot 1,602 \cdot 10^{-19}}$

(0,5) $\lambda = 25,65\ nm$
$= 25,65 \cdot 10^{-9}\ m$

3/ the ionisation energy :



(0,5) $\Delta E = E_\infty - E_1$

$E_\infty = -13,6 \frac{Z^2}{\infty}$ | $E_1 = -13,6 \frac{Z^2}{1^2}$

(0,25) $E_\infty = 0$ | $E_1 = -54,4\ e.V$ (0,5)

$\Delta E = 0 - (-54,4)$ $\Delta E = 54,4\ e.V$ (0,5)

4/ this wave length belong to the U.V rang

(0,25) $10 < \text{U.V rang} < 400\ nm$

$10 < \lambda = 25,65 < 400$