

Classification périodique des éléments.

Ex01 :

Quels sont les nombres quantiques principal « n » et secondaire « l » d'un électron 5s, 4d, 2p et 5f.

Quels sont, parmi les jeux suivants de nombres quantiques, ceux qui sont possibles ?

دائرة يكون مستقر
4 → m = 0

Cas	n	l	m	s
a	1	1	0	1/2
b	4	0	1	-1/2
c	6	4	-4	1/2
d	6	4	4	3/2
e	5	4	5	-1/2
f	3	2	1	1/2
g	2	0	0	0
h	2	1	1	1/2
i	0	0	0	1/2

4 (m) = 0

1) 5s
n=5 l=0
[5] 1 2 3 4
[5] 1 2 3 4

2) 4d
n=4 l=2
[4] 1 2 3 4
[4] 1 2 3 4

3) 2p l=1
n=2
l=[0, 1]
s p

4) 5f
n=5 l=3
l=[0, 1, 2, 3]

Règle de Pauli

1) appariés
2) non appariés
3) vide

Règle de Hund

1) ↑↓
2) ↑
3) vide

Ex02 :

1. Ecrire les configurations électroniques de chacun des éléments de numéro atomique 11, 14, 42 et 47.
2. Lequel d'entre eux possède le maximum d'électrons célibataires.
3. Donner les nombres quantiques qui caractérisent l'électron célibataire de l'élément Z = 47.

Ex03 :

I. Donner la configuration électronique des éléments suivants :

${}^2\text{He}$, ${}^3\text{Li}$, ${}^5\text{B}$, ${}^6\text{C}$, ${}^7\text{N}$, ${}^8\text{O}$, ${}^9\text{F}$, ${}^{10}\text{Ne}$, ${}^{11}\text{Na}$, ${}^{12}\text{Mg}$, ${}^{15}\text{P}$, ${}^{17}\text{Cl}$, ${}^{19}\text{K}$, ${}^{24}\text{Cr}$, ${}^{25}\text{Mn}$, ${}^{26}\text{Fe}$, ${}^{28}\text{Ni}$, ${}^{29}\text{Cu}$, ${}^{79}\text{Se}$, ${}^{35}\text{Br}$, ${}^{37}\text{Rb}$, ${}^{40}\text{Zr}$, ${}^{45}\text{Rh}$, ${}^{53}\text{I}$, ${}^{55}\text{Cs}$, ${}^{58}\text{Ce}$, ${}^{78}\text{Pt}$, ${}^{82}\text{Pb}$.

1. Indiquer la période, le groupe, le sous-groupe et le bloc pour chaque élément.

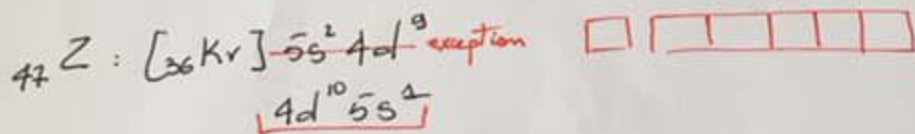
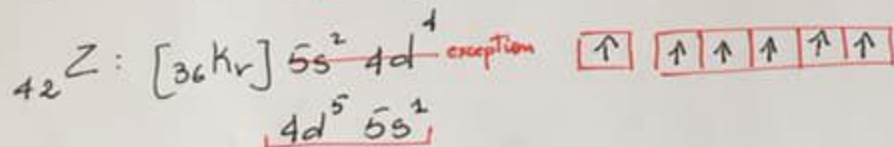
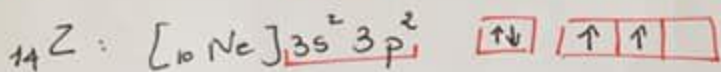
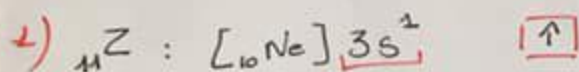
Série 4:

* Exercice 1:

1) $5s$	$4d$	$2p$	$5f$
$n=5$	$n=4$	$n=2$	$n=5$
$l=0$	$l=2$	$l=1$	$l=3$
$m=1$	$m=5$	$m=3$	$m=7$

2) * Sur la série *

* Exercice 2:



a) L'élément $Z=42$ possède le maximum d' e^- célibataires.



$$n=5$$

$$l=0$$

$$m=1$$

$$s = +\frac{1}{2}$$

* Exercice 3:

I) 1) La configuration^a électronique, périodes, groupes, s/g, blocs des éléments:

$2\text{He}: 1s^2$ $\boxed{\uparrow\downarrow}$ \nearrow_A bloc s $n=2$

$3\text{Li}: 1s^2 2s^1$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow}$ \nearrow_A bloc s $n=2$

$5\text{B}: 1s^2 2s^2 2p^1$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow}$ \nearrow_A bloc p $n=2$

$6\text{C}: 1s^2 2s^2 2p^2$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ \nearrow_A bloc p $n=2$

$7\text{N}: 1s^2 2s^2 2p^3$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ \nearrow_A bloc p $n=2$

$8\text{O}: 1s^2 2s^2 2p^4$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ \nearrow_A bloc p $n=2$

$9\text{F}: 1s^2 2s^2 2p^5$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ \nearrow_A bloc p $n=2$

$10\text{Ne}: 1s^2 2s^2 2p^6$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ \nearrow_A bloc o $n=2$

$11\text{Na}: [\text{Ne}] 3s^1$ $\boxed{\uparrow}$ \nearrow_A bloc s $n=3$

$12\text{Mg}: [\text{Ne}] 3s^2$ $\boxed{\uparrow\downarrow}$ \nearrow_A bloc s $n=3$

$13\text{P}: [\text{Ne}] 3s^2 3p^3$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ \nearrow_A bloc p $n=3$

$17\text{Cl}: [\text{Ne}] 3s^2 3p^5$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ \nearrow_A bloc p $n=3$

$19\text{K}: [\text{Ar}] 4s^1$ $\boxed{\uparrow}$ \nearrow_A bloc s $n=4$

$24\text{Cr}: [\text{Ar}] 4s^2 3d^4$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ \nearrow_B bloc d $n=4$

$25\text{Mn}: [\text{Ar}] 4s^2 3d^5$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow}$ \nearrow_B bloc d $n=4$

$26\text{Fe}: [\text{Ar}] 4s^2 3d^6$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ \nearrow_B bloc d $n=4$

$28\text{Ni}: [\text{Ar}] 4s^2 3d^8$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ \nearrow_B bloc d $n=4$

$29\text{Cu}: [\text{Ar}] 4s^1 3d^{10}$ $\boxed{\uparrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ \nearrow_B bloc d $n=4$

$34\text{Se}: [\text{Ar}] 4s^2 3d^{10} 4p^4$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ \nearrow_A bloc p $n=4$

$35\text{Br}: [\text{Ar}] 4s^2 3d^{10} 4p^5$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ \nearrow_A bloc p $n=4$

$37\text{Rb}: [\text{Kr}] 5s^1$ $\boxed{\uparrow}$ \nearrow_A bloc s $n=5$

$40\text{Zr}: [\text{Kr}] 5s^2 4d^2$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ \nearrow_B bloc d $n=5$

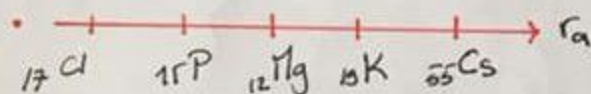
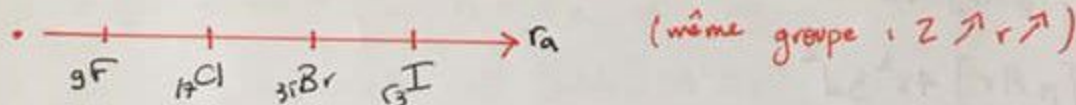
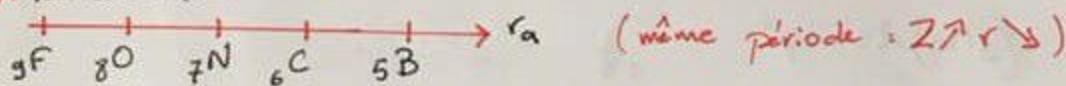
$45\text{Rh}: [\text{Kr}] 5s^2 4d^7$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ $\boxed{\uparrow\downarrow}$ \nearrow_B bloc d $n=5$

2) Les métaux:

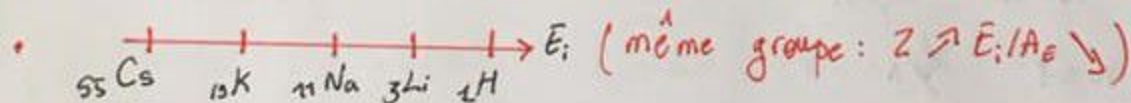
- Les métaux de transition: ${}_{26}\text{Fe}$; ${}_{28}\text{Ni}$; ${}_{45}\text{Rh}$.
- Les non-métaux: ${}_{2}\text{He}$; ${}_{5}\text{B}$; ${}_{6}\text{C}$; ${}_{7}\text{N}$; ${}_{8}\text{O}$; ${}_{9}\text{F}$; ${}_{10}\text{Ne}$; ${}_{15}\text{P}$; ${}_{17}\text{Cl}$
 ${}_{34}\text{Se}$; ${}_{35}\text{Br}$; ${}_{53}\text{I}$
- Les halogènes: ${}_{9}\text{F}$; ${}_{17}\text{Cl}$; ${}_{35}\text{Br}$.
- Les gaz rares: ${}_{2}\text{He}$; ${}_{10}\text{Ne}$

3) \hat{n} groupe que ${}_{41}\text{Mn}$ \Rightarrow groupe: VB \Rightarrow configuration électronique $[\text{Kr}] 5s^2 4d^5$
 \hat{n} période que ${}_{37}\text{Rb}$ \Rightarrow $n=5$ \Rightarrow $Z=43$.

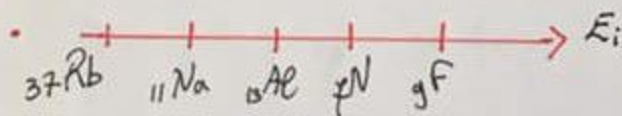
II) 1) rayon atomique:



2) énergie d'ionisation:



- même ordre d'électronégativité.



III) 1) $E_i(\text{Ne}) > E_i(\text{F}) > E_i(\text{Mg}) > E_i(\text{K})$

21,56

17,42

7,66

4,35

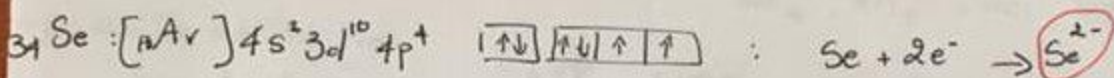
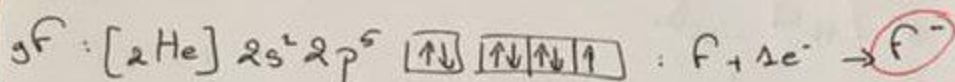
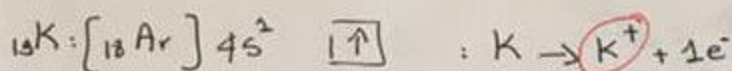
③

2) Le ${}_{10}\text{Ne}$ possède l'affinité électronique la plus élevée.

$$\text{IV) } 1) r_a(\text{K}) > r_a(\text{Ni}) > r_a(\text{Se}) > r_a(\text{F})$$

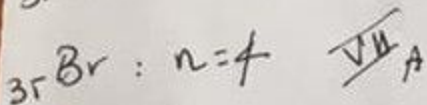
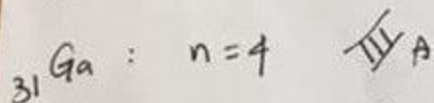
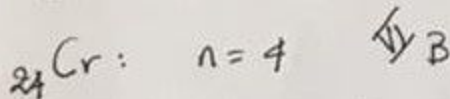
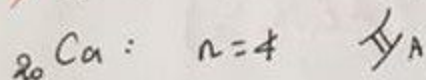
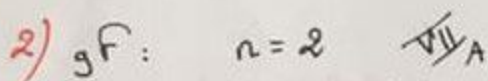
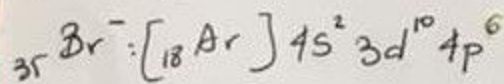
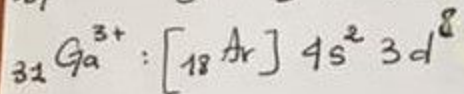
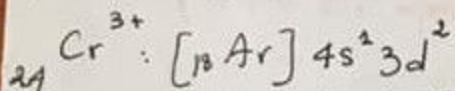
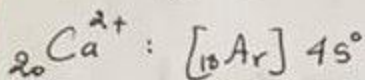
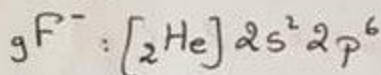
$$2,13 \quad 1,49 \quad 1,03 \quad 0,42$$

2) Les ions:



III)

4) Configuration électronique:



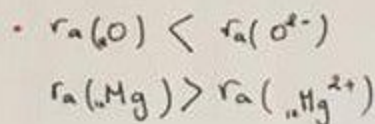
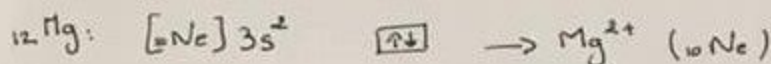
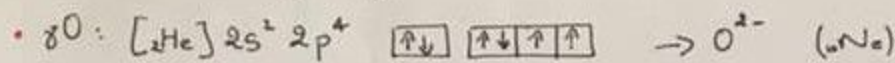
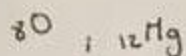
$$3) \chi(9\text{F}) = 4,03 \quad ; \quad \chi(24\text{Cr}) = 1,03$$

$$\chi(35\text{Br}) = 2,81$$

$$\chi(20\text{Ca}) = 1,61 \quad ; \quad \chi(31\text{Ga}) = 1,59$$

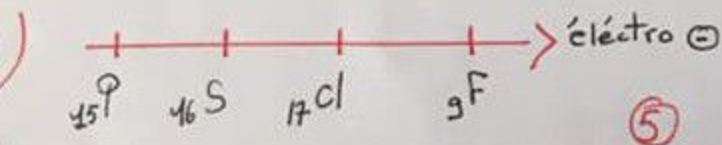
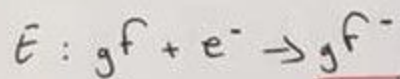
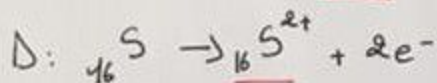
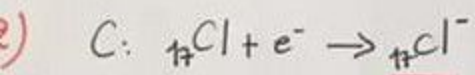
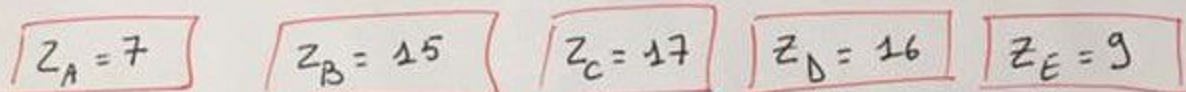
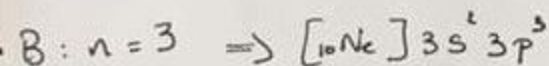
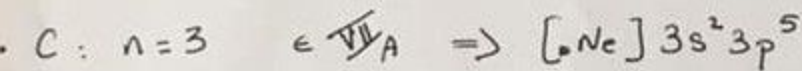
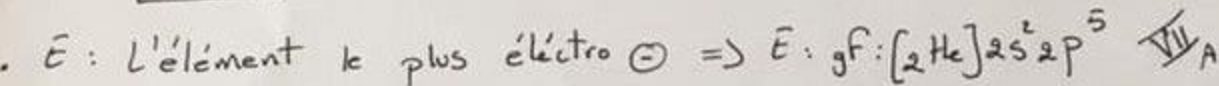
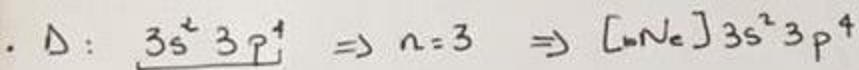
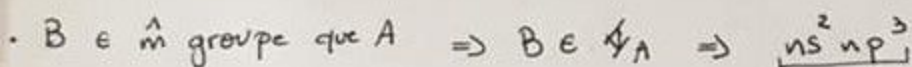
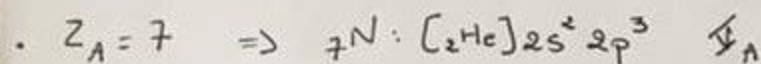
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* Exercise 4:



* Exercise 5:

1) On a les éléments A, B, C, D, E tq:



(5)