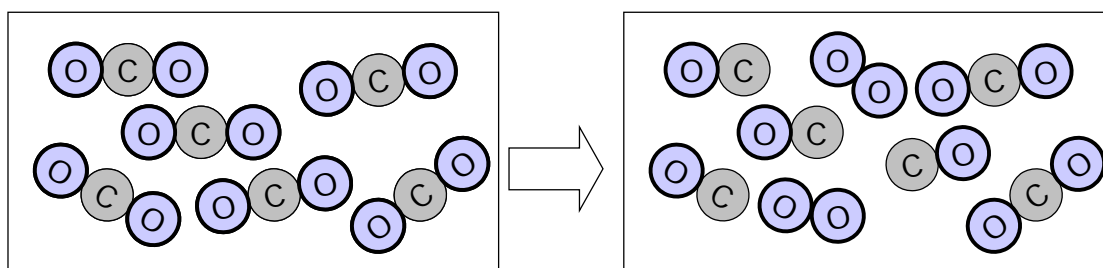
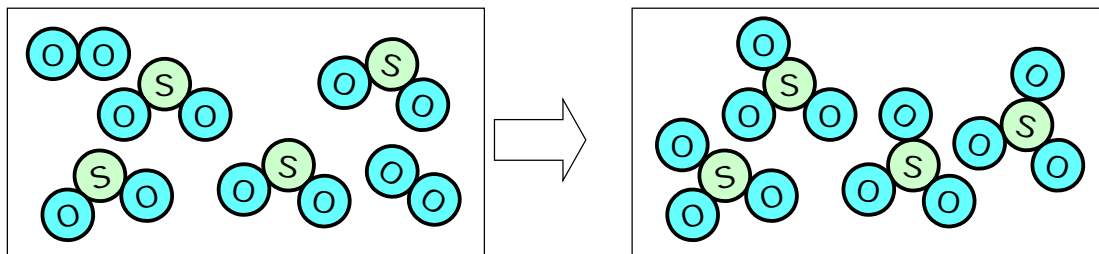
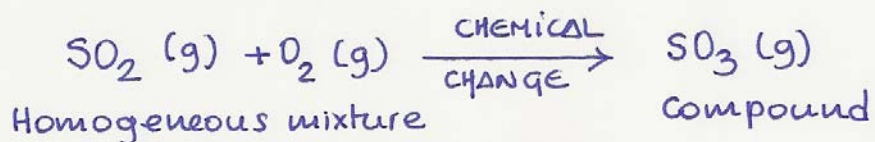


**Mock exam: SOLUTIONS**  
**"The Atomic Theory & The Periodic Table"**

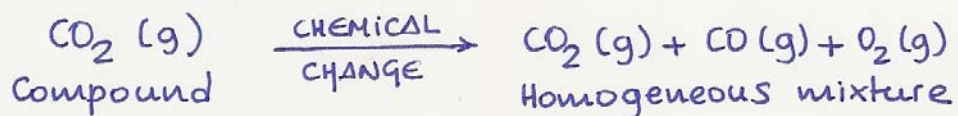
- 1 With the pictures below, do the following:
- classify the matter
  - classify the change
  - write the equations



1st transformation



2nd transformation



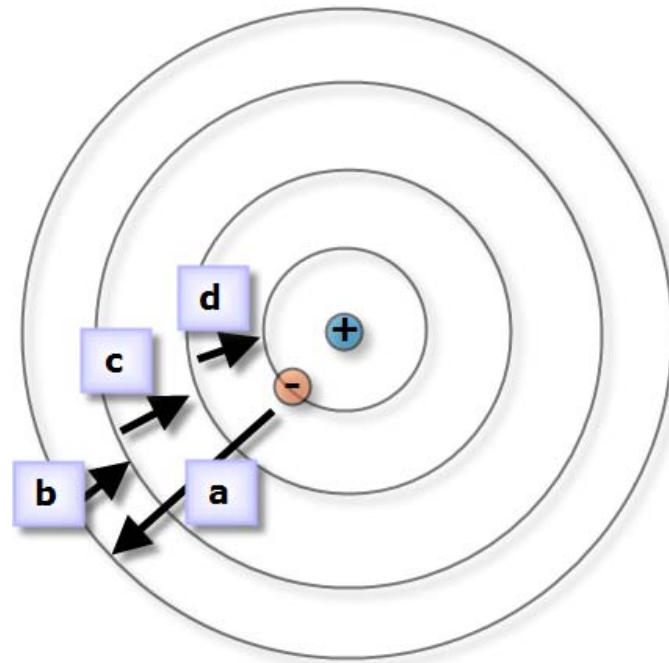
**2 Write the missing information about atoms / ions**

Atom or ion	A	Z	# of			Electron Configuration	
			p <sup>+</sup>	n <sup>0</sup>	e <sup>-</sup>	Orbital diagram	Lewis
${}^{14}_7\text{A}$						<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;"> </div> <div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;"> </div> <div style="border: 1px solid black; width: 40px; height: 20px; display: flex; justify-content: space-around; align-items: center;"> <span style="font-size: 8px;"> </span> <span style="font-size: 8px;"> </span> <span style="font-size: 8px;"> </span> </div> <div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;"> </div> <div style="border: 1px solid black; width: 40px; height: 20px; display: flex; justify-content: space-around; align-items: center;"> <span style="font-size: 8px;"> </span> <span style="font-size: 8px;"> </span> <span style="font-size: 8px;"> </span> </div> </div> <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>1s</span> <span>2s</span> <span>2p</span> <span>3s</span> <span>3p</span> </div>	
${}^{23}_{11}\text{B}$						<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;"> </div> <div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;"> </div> <div style="border: 1px solid black; width: 40px; height: 20px; display: flex; justify-content: space-around; align-items: center;"> <span style="font-size: 8px;"> </span> <span style="font-size: 8px;"> </span> <span style="font-size: 8px;"> </span> </div> <div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;"> </div> <div style="border: 1px solid black; width: 40px; height: 20px; display: flex; justify-content: space-around; align-items: center;"> <span style="font-size: 8px;"> </span> <span style="font-size: 8px;"> </span> <span style="font-size: 8px;"> </span> </div> </div> <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>1s</span> <span>2s</span> <span>2p</span> <span>3s</span> <span>3p</span> </div>	
${}^{\square}_7\text{A}^{3-}$				7		<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;"> </div> <div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;"> </div> <div style="border: 1px solid black; width: 40px; height: 20px; display: flex; justify-content: space-around; align-items: center;"> <span style="font-size: 8px;"> </span> <span style="font-size: 8px;"> </span> <span style="font-size: 8px;"> </span> </div> <div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;"> </div> <div style="border: 1px solid black; width: 40px; height: 20px; display: flex; justify-content: space-around; align-items: center;"> <span style="font-size: 8px;"> </span> <span style="font-size: 8px;"> </span> <span style="font-size: 8px;"> </span> </div> </div> <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>1s</span> <span>2s</span> <span>2p</span> <span>3s</span> <span>3p</span> </div>	
${}^{25}_{12}\text{C}^{\square}$					10	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;"> </div> <div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;"> </div> <div style="border: 1px solid black; width: 40px; height: 20px; display: flex; justify-content: space-around; align-items: center;"> <span style="font-size: 8px;"> </span> <span style="font-size: 8px;"> </span> <span style="font-size: 8px;"> </span> </div> <div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;"> </div> <div style="border: 1px solid black; width: 40px; height: 20px; display: flex; justify-content: space-around; align-items: center;"> <span style="font-size: 8px;"> </span> <span style="font-size: 8px;"> </span> <span style="font-size: 8px;"> </span> </div> </div> <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>1s</span> <span>2s</span> <span>2p</span> <span>3s</span> <span>3p</span> </div>	

Atom or ion	A	Z	# of			Electron Configuration		Lewis
			p <sup>+</sup>	n <sup>0</sup>	e <sup>-</sup>	Orbital diagram		
${}^{14}_7\text{A}$	14	7	7	7	7	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">↑↓</div> <div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">↑↓</div> <div style="border: 1px solid black; width: 40px; height: 20px; display: flex; justify-content: space-around; align-items: center;"> <span style="font-size: 8px;">↑</span> <span style="font-size: 8px;">↑</span> <span style="font-size: 8px;">↑</span> </div> <div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;"> </div> <div style="border: 1px solid black; width: 40px; height: 20px; display: flex; justify-content: space-around; align-items: center;"> <span style="font-size: 8px;"> </span> <span style="font-size: 8px;"> </span> <span style="font-size: 8px;"> </span> </div> </div> <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>1s</span> <span>2s</span> <span>2p</span> <span>3s</span> <span>3p</span> </div>	$\cdot\ddot{\text{N}}\cdot$	
${}^{23}_{11}\text{B}$	23	11	11	12	11	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">↑↓</div> <div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">↑↓</div> <div style="border: 1px solid black; width: 40px; height: 20px; display: flex; justify-content: space-around; align-items: center;"> <span style="font-size: 8px;">↑↓</span> <span style="font-size: 8px;">↑↓</span> <span style="font-size: 8px;">↑↓</span> </div> <div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">↑</div> <div style="border: 1px solid black; width: 40px; height: 20px; display: flex; justify-content: space-around; align-items: center;"> <span style="font-size: 8px;"> </span> <span style="font-size: 8px;"> </span> <span style="font-size: 8px;"> </span> </div> </div> <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>1s</span> <span>2s</span> <span>2p</span> <span>3s</span> <span>3p</span> </div>	Na	
${}^{14}_7\text{A}^{3-}$	14	7	7	7	10	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">↑↓</div> <div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">↑↓</div> <div style="border: 1px solid black; width: 40px; height: 20px; display: flex; justify-content: space-around; align-items: center;"> <span style="font-size: 8px;">↑↓</span> <span style="font-size: 8px;">↑↓</span> <span style="font-size: 8px;">↑↓</span> </div> <div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;"> </div> <div style="border: 1px solid black; width: 40px; height: 20px; display: flex; justify-content: space-around; align-items: center;"> <span style="font-size: 8px;"> </span> <span style="font-size: 8px;"> </span> <span style="font-size: 8px;"> </span> </div> </div> <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>1s</span> <span>2s</span> <span>2p</span> <span>3s</span> <span>3p</span> </div>	$\cdot\ddot{\text{N}}\cdot^{3-}$	
${}^{25}_{12}\text{C}^{2+}$	25	12	12	13	10	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">↑↓</div> <div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">↑↓</div> <div style="border: 1px solid black; width: 40px; height: 20px; display: flex; justify-content: space-around; align-items: center;"> <span style="font-size: 8px;">↑↓</span> <span style="font-size: 8px;">↑↓</span> <span style="font-size: 8px;">↑↓</span> </div> <div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;"> </div> <div style="border: 1px solid black; width: 40px; height: 20px; display: flex; justify-content: space-around; align-items: center;"> <span style="font-size: 8px;"> </span> <span style="font-size: 8px;"> </span> <span style="font-size: 8px;"> </span> </div> </div> <div style="display: flex; justify-content: space-around; font-size: 8px;"> <span>1s</span> <span>2s</span> <span>2p</span> <span>3s</span> <span>3p</span> </div>	Mg <sup>2+</sup>	

3 Look at the graphic below (this represents a hydrogen atom) and determine:

- the jumps in which the electron takes energy
- the jumps in which the electron releases energy
- the placement of the emitted photons (UV, visible, IR regions)



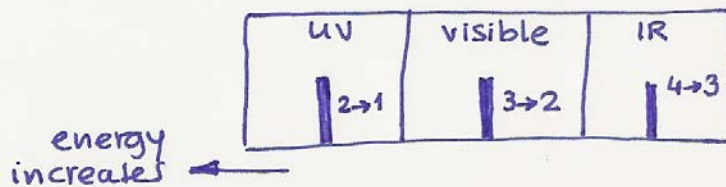
The electron...

- takes energy
- releases energy
- releases energy
- releases energy

... in jump...

- "a" ( $n=1 \rightarrow n=4$ )
- "b" ( $n=4 \rightarrow n=3$ )
- "c" ( $n=3 \rightarrow n=2$ )
- "d" ( $n=2 \rightarrow n=1$ )

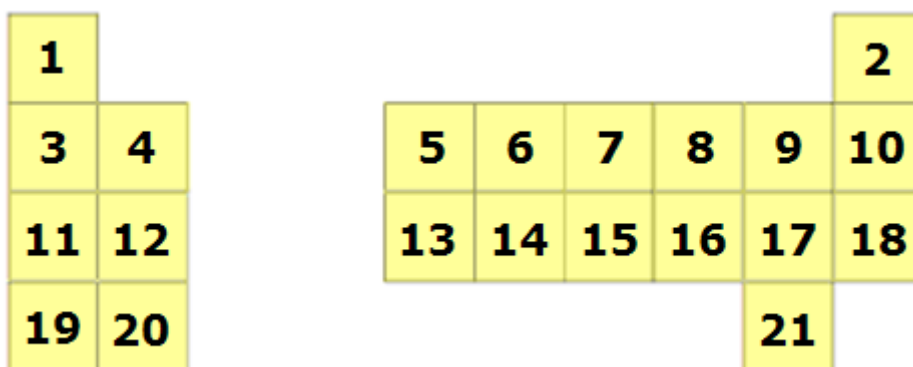
The spectrum:



4

Identify (indicating the number) the following elements in the periodic table below

- the element with the symbol "K"
- the element with the symbol "Cl"
- the element with the symbol "H"
- the element with the symbol "O"
- the element with the symbol "N"
- the element of the second period that forms a monpositive ion
- the element of the fourth period that forms a mononegative ion
- the element of the third period that forms a two positive ion
- the element of the third period that forms a two negative ion
- the element with the electron configuration  $1s^2 \dots 2s^2 2p^4$
- the element with the electron configuration  $1s^2 \dots 2s^2 2p^6$



- the element with the symbol "K"
- the element with the symbol "Cl"
- the element with the symbol "H"
- the element with the symbol "O"
- the element with the symbol "N"
- the element of the second period that forms a monpositive ion
- the element of the fourth period that forms a mononegative ion
- the element of the third period that forms a two positive ion
- the element of the third period that forms a two negative ion
- the element with the electron configuration  $1s^2 \dots 2s^2 2p^4$
- the element with the electron configuration  $1s^2 \dots 2s^2 2p^6$

19 17 1 8 7

3

21

12

16

10

8

Identify (indicating the number) the elements that meet the properties that appear below

5

- the element from the second period that has  $Z^*=2$
- the element from the first period that has  $Z^*=2$
- the element from the first period that has  $Z^*=1$
- the element from the third period that has  $Z^*=7$
- the element from the second period that has  $Z^*=5$
- the element with the smallest atom from the second period
- the element with the largest atom from group 5A
- the element with the biggest metallic behavior from alkaline earth metals
- the element with the highest value of electronegativity from the third period (the noble gases excluded)
- the element with the highest value of electronegativity from the group 14
- the element from the first two groups which is a nonmetal

1						2	
3	4						
11	12						
19	20						
		5	6	7	8	9	10
		13	14	15	16	17	18
						21	

10  
 15  
 20  
 17  
 6  
 1

- the element from the second period that has  $Z^*=2$
- the element from the first period that has  $Z^*=2$
- the element from the first period that has  $Z^*=1$
- the element from the third period that has  $Z^*=7$
- the element from the second period that has  $Z^*=5$
- the element with the smallest atom from the second period
- the element with the largest atom from group 5A
- the element with the biggest metallic behavior from alkaline earth metals
- the element with the highest value of electronegativity from the third period (the noble gases excluded)
- the element with the highest value of electronegativity from the group 14
- the element from the first two groups which is a nonmetal

4  
 2  
 1  
 17  
 7