EXAM REVIEW : Chapter 5

1. **Match up the scientific concept on the left with the correct definition of the right :**

Excited State	The outermost electron shell of an atom that contains the electrons that are involved in chemical reactions.
Ground State	Has an incomplete Outer Shell which makes an atom unstable and likely to take part in chemical reactions.
Octet Rule	A rule that describes the order in which electrons will fill up Orbitals.
Chemically Reactive	The lowest-energy, most stable state of an electron.
Aufbau Principle	Atoms will strive to gain, lose or share electrons to achieve a stable arrangement of 8 electrons in their Valence Shell.
Hund's Rule	A higher-energy, unstable stable that occurs when an electron absorbs energy and moves to a higher orbital.
Valence Shell	Before any orbital gets a second or paired electron, every other orbital in that subshell must first have at least 1 electron.
Pauli Exclusion Principle	If two electrons share an orbital position (are paired), they must have opposite spins.

LIVEWORKSHEETS

2. You are attempting to draw a Bohr Diagram for Magnesium :

Magnesium's Chemical Symbol is :

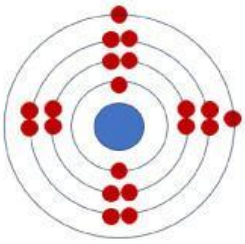
In which Period on the Periodic Table is Magnesium ?

How many Electron Shells will Magnesium's Bohr Diagram have ?

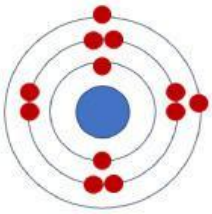
How many Electrons does a Magnesium atom have ?

How many Valence Electrons does a Magnesium atom have ?

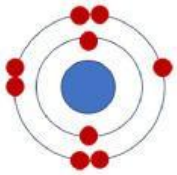
Using all the data that you gathered above, which of the following is the correct Bohr Diagram for a Magesium atom ?



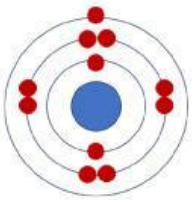
A



B



C



D

Does Magnesium fulfill the Octet Rule ?

Is Magnesium chemically stable ?

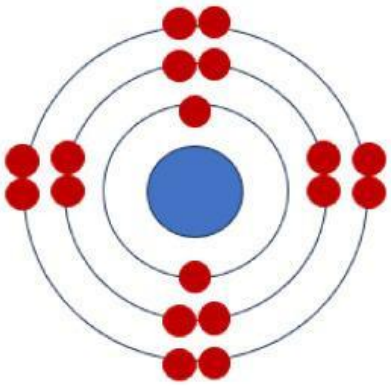
Will Magnesium be prone to take part in chemical reactions ?

What will Magnesium's role be in a chemical reaction ?

a) It will strive to gain 6 electrons so that its Valence Shell can be full.
b) It will strive to gain 8 electrons so that its Valence Shell can be full.
c) It will strive to shed/give away 6 electrons so that it can attain a stable state.
d) It will strive to shed/give away 2 electrons so that it can attain a stable state.

LIVEWORKSHEETS

3. Look at the Bohr Diagram on the right and answer the questions that follow :



What is the name of this Element ?

What is its Chemical Symbol ?

In which Period on the Periodic Table is this element ?

How many Valence Electrons does this atom have ?

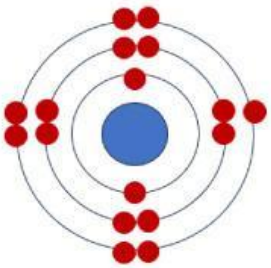
How many Core Electrons does this atom have ?

Does this atomic structure fulfil the Octet Rule ?

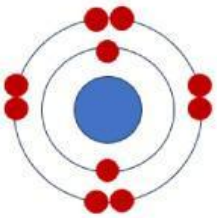
Is this atom considered chemically stable ?

Will this atom take part in a chemical reaction ?

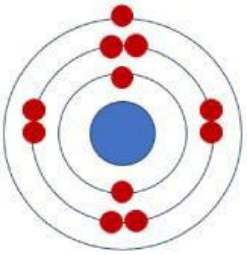
4. Look at the 3 Bohr Diagrams below and answer the questions that follow :



A



B



C

Which 2 of these Atoms are most like to chemically react with one another ?

How will this reaction most likely take place ?

a) A will lose an electron while B will gain that electron.

b) A will lose an electron while C will gain that electron.

c) B will lose an electron while A will gain that electron.

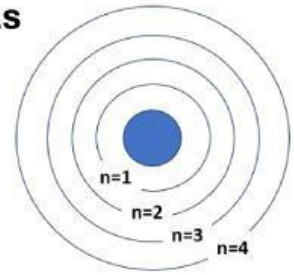
d) B will lose an electron while C will gain that electron.

e) C will lose an electron while B will gain that electron.

f) C will lose an electron while A will gain that electron.

LIVEWORKSHEETS

5. **The Diagram to the right depicts the first 4 Energy Levels on a Bohr Diagram. Answer the following questions :**



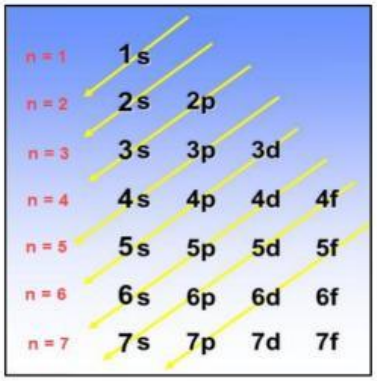
Select the correct options for Energy Level 2 (n=2) :

Type of Sublevel (Orbital Type)	#Orbitals	Max #Electrons inside the Orbitals
s		
p		
d		
f		

Select the correct options for Energy Level 4 (n=4) :

Type of Sublevel (Orbital Type)	#Orbitals	Max #Electrons inside the Orbitals
s		
p		
d		
f		

6. **Use the Aufbau Principle to find 2 mistakes in the following Electron Configuration (select the 2 sections in which you see the errors) :**

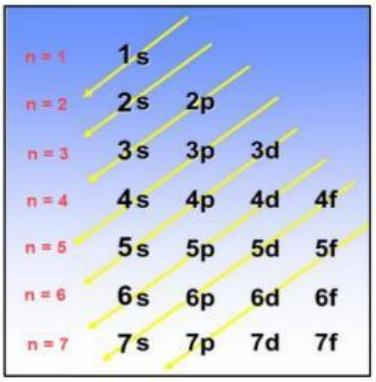


$$1s^2\ \ 2s^2\ \ 2p^4\ \ 3s^2\ \ 3p^6\ \ 4s^2\ \ 3d^{10}\ \ 4p^6\ \ 5s^2\ \ 4d^8\ \ 5p^6$$

What would be the next entry in the above configuration ?

LIVEWORKSHEETS

7. Utilize the Aufbau Principle to find the Electron Configuration for Silicon (Si).



Silicon's Atomic Number =

#Protons = #Electrons =

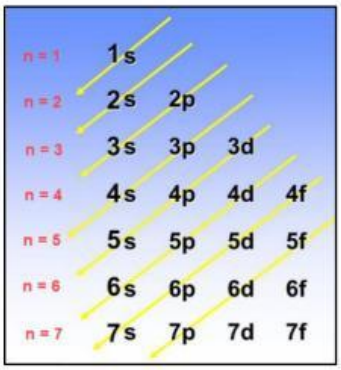
Silicon is in Period _____ on the Periodic Table.

Silicon has _____ Main Energy Levels.

Silicon is in the _____ Block on the Periodic Table.

Write the Electron Configuration for Si using the Aufbau Principle :

8. Utilize the Aufbau Principle to find the Electron Configuration for Sodium (Na).



Sodium's Atomic Number =

#Protons = #Electrons =

Sodium is in Period _____ on the Periodic Table.

Sodium has _____ Main Energy Levels.

Sodium is in the _____ Block on the Periodic Table.

Using the Aufbau Principle (or "reading" the Periodic Table from left to right) :

The Noble Gas just before Sodium on the Periodic Table, is _____.

Use this information to provide a "shorthand" for the Electron Configuration that you figured out above:

LIVEWORKSHEETS

9. **Identify the following atoms :**

$1s^2\ 2s^2\ 2p^6$

$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}$

$1s^2\ 2s^2$

10. **The Electron Configuration for Oxygen is :**

$1s^2\ 2s^2\ 2p^4$

Write this in Orbital Notation using Hund's Rule (you have the exact amount of arrows to drag and drop) :



1s 2s 2p 3s

O : _____ _____ _____ _____ _____ _____

Now provide the "shorthand" Orbital Notation :

2s 2p

_____ _____ _____ _____

LIVEWORKSHEETS

11. Provide the Orbital Notation for Sodium :



1s 2s 2p 3s

Na: _____ _____ _____ _____ _____ _____

Now provide the "shorthand" Orbital Notation :

3s

_____

12. Provide the Electron Dot Notation for Nitrogen. Only use the required amount of dots. Throw the un-used dots in the trash can :

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

Nitrogen is in Group _____ on the Period Table. This means it has _____ Valence Electrons.





13. Provide the Electron Dot Notation for the element that has the following Electron Notation :

[He] $3s^2$ $3p^5$

LIVEWORKSHEETS

Only use the required amount of dots. Throw the un-used dots in the trash can :

① ② ③ ④ ⑤ ⑥ ⑦ ⑧



14. How does an Atom become a Cation ?

a) When an Atom loses a proton, it will have more electrons than protons, giving it a negative charge.

b) When an Atom loses an electron, it will have more protons than electrons, giving it a positive charge.

c) When an Atom gains a proton, it will have more protons than electrons, giving it a positive charge.

d) When an Atom gains an electron, it will have more electrons than protons, giving it a negative charge.

15. How does an Atom become an Anion ?

a) When an Atom loses a proton, it will have more electrons than protons, giving it a negative charge.

b) When an Atom loses an electron, it will have more protons than electrons, giving it a positive charge.

c) When an Atom gains a proton, it will have more protons than electrons, giving it a positive charge.

d) When an Atom gains an electron, it will have more electrons than protons, giving it a negative charge.

LIVEWORKSHEETS

16. Drag & Drop each of the following items into the correct box :

Has a positive charge.	Forms when an Atom loses an Electron.	$[Na]^{+}$	Has more Electrons than Protons.
Has a negative charge.	Forms when an Atom gains an Electron.	$[O]^{2-}$	$[Ca]^{2+}$

Cation	Anion

LIVEWORKSHEETS