Ionic Bonding Worksheet

Name :
Class :
Group :

In nature, hydrogen gas (H_2), oxygen gas (O_2), nitrogen gas (N_2) and chlorine gas (Cl_2) are found diatomically. Elements such as lithium, sodium, potassium, beryllium, magnesium and atoms of other elements are never found free. These atoms can only be found in the form of compounds (bonded with other atoms) such as magnesium chloride ($MgCl_2$), oxygen gas (O2), table salt (NaCl) that we use every day. How can NaCl be formed?

Group VIIIA elements in the periodic table of elements, namely He, Ne, Ar, Xe, Rn are found in nature in a free state (monatomic) in gaseous form. Why did this happen?

1. Stability of Noble Gas

The noble gases are elements of group 8A in the periodic table. Called noble because these elements are very stable (very difficult to react). The first noble gas element to be discovered was argon. None of the natural compounds of the noble gases were found. According to Lewis, the stability of the noble gas is due to its fully filled electron configuration, namely the octet configuration (duplet for Helium).

Duplet rule	:	stable electron configuration with two electrons in the outermost shell
Octet rule	:	stable electron configuration with eight electrons in the outer shell

Complete the following table.

No	Atom	Electron Configuration	Valence Electrons
1.	$_{2}He$		
2.	$_{10}Ne$		
3.	$_{18}Ar$		
4.	$_{36}Kr$	2 8 18 8	

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5.	$_{54}Xe$	2 8 18 18 8	
6.	$_{86}Rn$	2 8 18 32 18 8	

Note: valence electrons are the last electrons

No	Question	Answer
1.	Based on the activity table above, how many valence electrons does Helium have?	
2.	Based on the activity table above, how many valence electrons does Neon, Argon, Krypton, Xenon, and Radon have?	
3.	Is the electron configuration of the noble gases stable?	

2. The Trend of An Element to Achieve Stability

Complete the following table:

Atom	Electron Configuration	Valence Electrons	Giving up/accepting electrons	New Electron Configuration	Ion Symbol
$_{3}Li$	2 1	1	Giving up 1 e	2	Li^{+}
$_{12}Mg$	2 8 2	2	Giving up 2 e	2 8	Mg^{2+}
$_{13}Al$					Al^{3+}
$_{7}N$	2 5	5	Accepting 3 e	2 8	N^{3-}
$_{8}O$					O^{2-}
$_{9}F$					F^{-}

No	Question	Answer
1.	Based on the activity table above, if the valence electrons are more than 4, will electrons lose or gain electrons?	
2.	Based on the activity table above, if the valence electrons are less than 4 then the electrons will lose or receive electrons?	

3. Formation of Ionic Bonds

Ionic bonds occur because of the release and acceptance of electrons in the outer shell, namely between positive ions and negative ions. Positive ions are formed because an atom loses electrons which generally occurs in atoms that have a low ionization potential (groups IA and IIA). Usually these elements are metallic. Negative ions are formed because an atom accepts electrons, generally occurs in atoms that have high affinity (VIA and VIIA). Usually the elements are nonmetals.

Example:

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$_{11}$Na dengan $_{9}$F

$_{11}Na \rightarrow Na^{+} + 1e$

(2,8,1) (2,8)

$_{9}F + 1e^{-} \rightarrow F^{-}$

(2.7) (2. 8) +

$Na^{+} + F^{-} \rightarrow Na^{+}.F^{-} \rightarrow NaF$

Describe the process of ionic bonding between the following elements:

$_{19}$K dengan $_{8}$O

$_{19}K \rightarrow$ ... + ...

( ) ( )

$_{8}O$ + ... $e^{-} \rightarrow$ ...

( ) ( ) +

...

4. Ionic Bonding

Logam	AB_3
Non logam	AB
$_{11}$A dan $_{16}$B	kation
$_{12}$A dan $_{8}$B	AB_2
$_{13}$A dan $_{7}$B	anion

Conclusion

The noble gases are the most _____

This stability is due to the arrangement of electrons in the number of _____ Electrons in the outermost shell, except for Helium (has a full electron configuration). It is known as _____ except Helium with _____ (2 electrons in outer shell).

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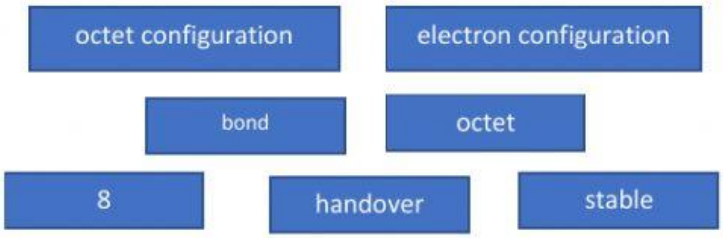
Other elements can achieve an octet configuration by forming _____ in order to match their electron configuration with the electron configuration of the nearest noble gas. This tendency is called the rule _____
The octet configuration (noble gas stable configuration) can be achieved by losing, gaining or pairing electrons. Ionic bonds occur because electrons have different charges.



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