

GENERAL SCIENCE NOTES FOR 7TH CLASS (FOR ISLAMABAD)

6

CHEMICAL BONDS

Questions and Activities

A. MCQs (Choose the correct option)

1. The valency of nitrogen is 3 and that of hydrogen is 1. The chemical formula of ammonia is

- a. NH b. NH₂
c. NH₃ d. NH₄

Ans: c. NH₃

2. During the formation bond, metals tend to:

- a. Gain electrons
b. Lose electrons
c. Gain protons
d. Lose neutrons.

Ans: b. Lose electrons

3. Electrostatic attraction occurs between two

- a. neutral atoms.
b. ions of opposite charges.
c. ions of similar charges.
d. bonded atoms.

Ans: b. ions of opposite charges.

4. The electrons involved in bonding are found in

- a. closest to the nucleus.
b. in the nucleus.
c. in the outermost shell.
d. innermost shell.

Ans: c. in the outermost shell.

5. An atom that has 6 out of 8 electrons in its outermost shell will

- a. give up 2 electrons.
b. gain 2 electrons.
c. give up 6 electrons.
d. considered stable and not react with other elements.

Ans: b. gain 2 electrons.

6. A negative ion is formed when an atom has:

- a. Gained a proton
b. Gained an electron
c. Lost a proton
d. Lost an electron

Ans: b. Gained an electron

7. Aluminum oxide is formed from aluminum ion (Al³⁺) and an oxide ion (O²⁻). The formula of aluminum oxide is?

- a. AlO b. AlO₂
c. Al₂O₃ d. Al₃O₂

Ans: c. Al₂O₃

8. The atomic number of hydrogen atom is one. The number of valence electron in Hydrogen atom is

- a. 0 b. 1
c. 2 d. 3

Ans: b. 1

9. The elements of group II loses

- a. one electron.
b. two electrons.
c. three electrons.
d. do not lose electrons.

Ans: b. two electrons.

10. A chemical formula is used to describe the types of:

- a. Ions and their numbers
b. Atoms and their numbers

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- c. Molecules and their numbers
d. Valence electrons and their numbers

Ans: b. Atoms and their numbers

B. True and False (correct the statement if it False)

1. **Opposite charges attract each other.**

Ans: True

2. **Ions with same charges are held together by electrostatic force of attraction between them.**

Ans: False. Ions with different charges are held together by electrostatic force of attraction between them.

3. **Chemical formula are used to describe the types of atoms only.**

Ans: True

4. **The combining capacity of an atom to compound is called its valency.**

Ans: False. The combining capacity of an atom to form a bonds is called valency.

5. **Chemical bond formed as a result of attraction between nuclei and valence electrons.**

Ans: True

C. Short questions.

1. **Why the valency of group II elements is 2?**

Ans: The second group of the periodic table is the group concerned with the filling of the S orbit. Thus, the element in the second group of the periodic table will have an outermost S orbital filled with two electrons of different spins. Hence, the number of valence electrons in group 2 is two.

2. **By using valency, write the chemical formula of carbon dioxide?**

Ans: The chemical or molecular formula for carbon dioxide is CO_2 . The central carbon atom is joined to two oxygen atoms by covalent double bonds. The chemical structure is centrosymmetric and linear, so carbon dioxide has no electric dipole.

3. **In the formation of an ion, why magnesium atom loses two electrons?**

Ans: Its compound with non-metallic oxygen is an electrovalent compound. Therefore in the formation of magnesium oxide magnesium atom loses two electrons from its valence shell to attain the stable octet structure of nearest noble gas Ne.

4. **How could you relate the formation of chemical bond with valence electrons?**

Ans: Valence electrons are outer shell electrons with an atom and can participate in the formation of chemical bonds. In single covalent bonds, typically both atoms in the bond contribute one valence electron in order to form a shared pair.

5. **With the help of venn diagram compare and contrast between cation and anion.**

Neutral Atom



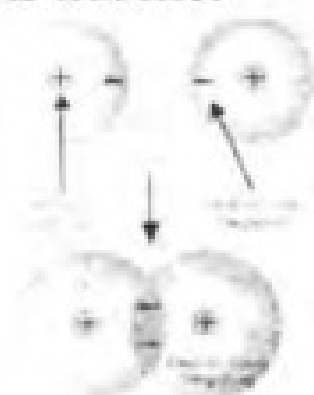
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Ans:

Cations	Anions
Positive charge	Negative charge
Loses electron	Gaining electrons
Metal	Non-metal

Anions. Lead, Sodium etc. Sulfide, oxide, chloride etc.

6. Briefly explain the formation of chemical bond as a result of electrostatic force of attraction between atoms.



Ans: When two atoms interact, with each other, they experience a force of attraction. Electrons have a negative charge and the nuclei have positive charge. When atoms comes close to each other both attractive and repulsive forces increases as the electrostatic attraction holds the two atoms together, and form chemical bonds.

7. How are H^{1+} ion and O^{2-} ion different from each other?

Ans: A hydrogen atom with one valence electrons needs one additional electron to complete the first energy level. An oxygen atom has six valence electrons and needs two additional electrons to complete the second energy level.

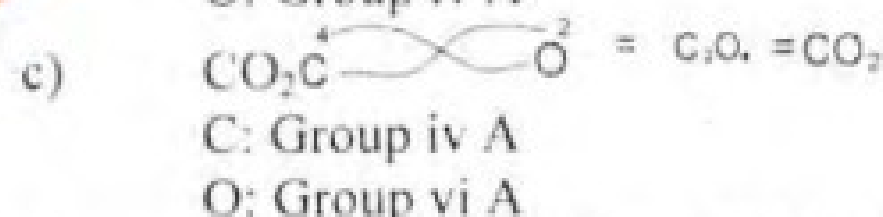
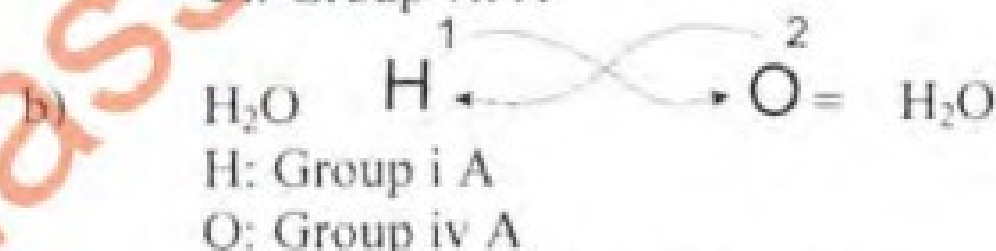
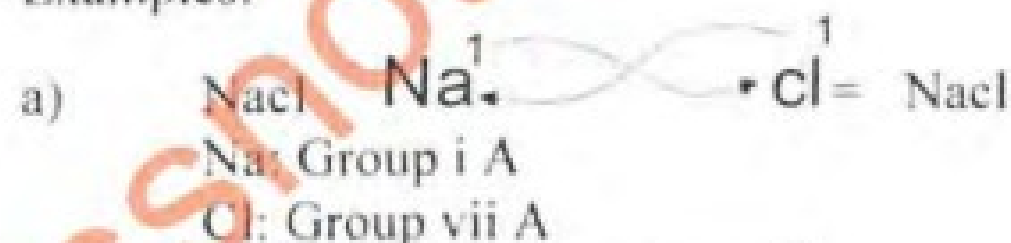
D. Long questions

1. Write the steps for writing a chemical formula. Illustrate with few examples.

Ans: Steps for Writing Chemical formulas:

- Write down the symbols of the elements.
- Above each symbol write its valency.
- Cross the valency of both elements.
- If the valency can be simplified, divide them by the least Valency.
- Write the chemical formula.

Examples:



2. How chemical bond is formed? Explain in detail with the help of an example.

Ans: Formation of Chemical Bonds:
 A chemical bond is a mutual attraction between the nuclei and valence electrons of different atoms that binds the atoms together. The valence electrons are involved in binding of one atom to another.

When two atoms interact with each other, they experience charge and the nuclei have positive charge. The nucleus of

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one atom attracts the electrons of other atom. When atoms comes close to each other both attractive and repulsive forces increase as the distance between the atom decreases. This electrostatic attraction holds the two atoms together.

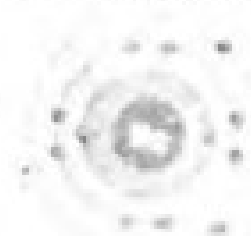
As the attraction brings the atoms together, electrons from each atom are attracted to the nucleus of the atoms and form chemical bonds.

E. Structured Questions

1. Complete the table

Element	Atomic number	Electronic distribution	Outer most electrons	In forming a compound the atom..	- Valency
Nitrogen	7	2,5	5	Gain or share 3 electrons	-3
Beryllium	4	2,2	2	Loses 2 electrons	+2
Neon	10	2,8	8	No gain no lose	0
Magnesium		2,8,2	2	Loses 2 electrons	+2
Lithium	3	2,1	1	Loses 1 electron	+1
Helium	2	2	2	No gain no lose	0

2. Magnesium and oxygen react to form magnesium oxide (MgO). The electronic arrangement for the two elements is:



- a. Answer these question about magnesium atom.
- i. Does it gain or lose electrons to form an ion?

Ans: It loses electrons to form an ion.

- ii. How many electrons are transferred?

Ans: 2 electrons are transferred.

- iii. Is the ion form positive or negative?

Ans: The ion form is positive.

- iv. What charge does the ion have?

Ans: Magnesium loses 2 electrons and becomes a positively charged ion called "Cation".

- b. Now repeat (a), but for Oxygen atom.

- i. Does it gain or lose electrons to form an ion?

Ans: It gains electrons to form an ions.

- ii. How many electrons are transferred?

Ans: 2 electrons are transferred.

- iii. Is the ion form positive or negative?

Ans: The ion form is positive.

- iv. What charge does the ion have?

Ans: Oxygen gains 2 electrons and becomes negatively charged ion is called "anion".

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3. The four circle below represent atoms of four common elements. Study these carefully and then write the chemical formula for each of the eight molecules shown in the chart. Water (H₂O), has already been done for you.



1. Which group is likely to lose two electrons?

Ans. Group II is likely to loses two electrons.

2. The atomic number of Neon is 10. It is in group viii A. What will be its Valency?

Ans. Its valency will be zero (0).

3. What will be the charge on the atom. That has gained three electrons?

Ans. The atom that has gained three electrons, the charge on that will be -3.

Try it out

Identify the number of atoms in H₂SO₄

	Hydroge n	Sulphu r	Oxyge n
Number s of Atoms	2	1	4

- ♦ MCQs (Choose the correct option)

1. The combining capacity of the _____ to form chemical bond is called its valency.

a. atom b. cell
c. element d. nucleus

Ans: a. atom

2. The elements which have _____ Valency do not form compounds.

a. one b. two
c. zero d. -one

Ans: c. zero

3. Group vi gains or shares _____ electrons, to form a compound.

a. 1 b. 2
c. 3 d. 0

Ans: b. 2

4. Which group is likely to gains or shares i electron?

a. Group i b. Group iii
c. Group 0 d. Group viii

Ans: d. Group vii

5. What is the common name of Nacl?

a. Sugar b. Water
c. Salt d. Air

Ans: c. Salt

6. Valence _____ are in the outermost shell of the atom.

a. nucleus b. electrons

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c. protons d. neutrons

Ans: b. electrons

7. A positive ion is formed when an atom.

- a. Gained a proton
- b. Gained an electron
- c. Lost a proton
- d. Lost an electron

Ans: d. Lost an electron

8. _____ charge attract each other.

- a. Same b. Negative
- c. opposite d. positive

Ans: c. opposite

9. The electronic distribution of chlorine is:

- a. 2,8,7 b. 2,8,4
- c. 2,8,1 d. 2,8,6

Ans: a. 2,8,7

10. Chemical formula of Carbon monoxide is:

- a. C₂O₄ b. CO₂
- c. CO d. none of them

Ans: C.CO

C. Short questions.

1. Define valency.

Ans: The combining capacity of the atom to form a chemical bond is called its Valency. The valency of an element is the number of electrons its atom gains, loses or shares, to form a compound.

2. What is an ion?

Ans: An ion is a charged particle formed either by loss or gain of one or more electrons.

3. How you define valence electrons?

Ans: Valence electrons are in the outermost shell of the atom, and

are able to interact with other atoms to form chemical bonds.

4. Draw a label diagram to show Valence Electrons in Outermost Shell.

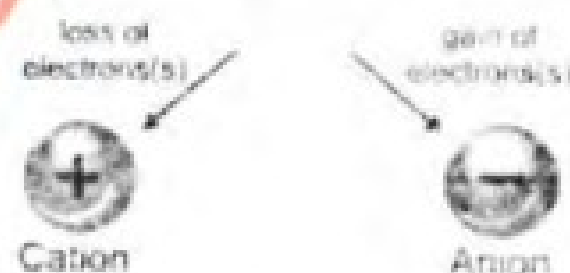
Ans:



5. Draw a label diagram of formation of ions.

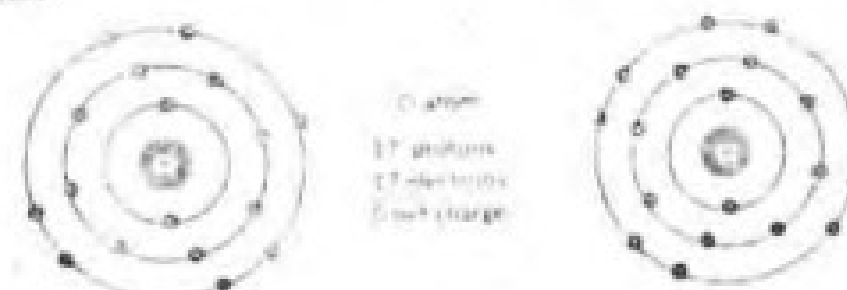
Ans:

Neutral Atom



6. Show the formation of Anion (Gaining Electrons)

Ans:



F. Project Work

With the help of chart paper, colour markers and coloured play dough, make the model of the lithium atom and the lithium ion. Highlight the difference between them.

Ans: Practical Work

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