

GIRLS' HIGH SCHOOL & COLLEGE, PRAYAGRAJ

WORKSHEET 2

SESSION 2020-21

CLASS- 9 A, B, C, D, E, F

SUBJECT: CHEMISTRY

INSTRUCTIONS: Parents are expected to ensure that the student spends two days to read and understand the topics of the chapter according to the books and websites referred and thereafter answer the given questions.

Note: Chapter-The Language of Chemistry

Student should refer to books of Class 6, 7, 8 & class 9 book "Concise Chemistry by Dr. S P Singh(Selina Publications)" for reference and also the following websites:

www.wikipedia.com or chem.libretexts.org

Answer the following questions

Q1) Fill in the blanks with the choice given in the brackets:

- (a) Elements with one, two or three electrons in their outermost orbit are _____ and elements with five, six or seven electrons in outermost orbit are _____.(metals/non metals)
- (b) Elements lose electrons to form _____ ions and are known as _____. Elements gain electrons to form _____ions and are known as _____.(negative, cations, positive, anions)

* A radical is an atom or a group of atoms of the same or of different elements that behaves as a single unit with a positive or negative charge.

When a radical is made up of a group of two or more different atoms it is called a polyatomic ion eg. SO_4^{2-}

Q2) Give the formula and valency of:

- (a) Aluminate
- (b) Chromate
- (c) Aluminium
- (d) Cupric
- (e) Ferrous
- (f) Perchlorate

Q3) Give two examples in each case:

- (a) Monovalent cation
- (b) Divalent cation
- (c) Trivalent cation
- (d) Tetravalent cation
- (e) Monovalent anion
- (f) Divalent anion
- (g) Trivalent anion
- (h) Tetravalent anion

Q4)(a) Explain the term variable valency. Why an element is said to exhibit variable valency ?

(b) Name three elements which exhibit variable valency. Mention their valencies also.

Q5) $M(NO_3)_2$ is the formula of the nitrate of a metal M. Write down the formula of its:

[Hint: First find the valency of the metal 'M' then by criss-cross method find the formula]

(a) Hydroxide

(b) Borate

(c) Dichromate

Q6) Write the chemical names of the following compounds:

(Always remember that while naming compounds positive ion is written first followed by the negative ion)

(a) $Ca_3(PO_4)_2$

(b) K_2CO_3

(c) $(NH_4)_2S$

(d) Ag_2SO_3

(e) $Ba(ClO_2)_2$

(f) $KMnO_4$

(g) $(CH_3COO)_2Pb$

(h) $Mg(HCO_3)_2$

*** To calculate the valency from the formula:**

The valency of elements can be determined based on the knowledge of the valencies of radicals and of the fact that the valency of

Hydrogen [H] = 1

Oxygen [O] = 2

Chlorine [Cl]=1

Procedure to find the valency (demonstration with example)

1. Write the given formula eg. NO_2

2. Interchange the subscript and write it as superscript i.e N^2O^1

3. The valency of oxygen is taken as 2, therefore, multiplying both the superscripts by 2
i.e $N^{2 \times 2} O^{1 \times 2}$

4. The result gives the valency of the elements i.e. N^4O^2

Thus , from the formula NO_2 we find that the valency of nitrogen is 4.

Q7) What is the valency of Nitrogen in the following compounds:

(a) NO

(b) N_2O

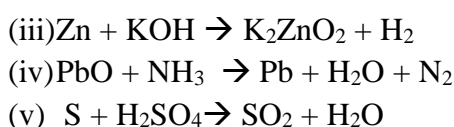
(c) N_2O_3

Q8)(a) Name the fundamental law that is involved in every equation.

(b)Balance the following equations:

(i) $Fe + H_2O \rightarrow Fe_3O_4 + H_2$

(ii) $Ca + N_2 \rightarrow Ca_3N_2$



Q9) Write the balanced chemical equations for the following word equations:

- (a) Aluminium carbide + water \rightarrow aluminium hydroxide + methane
 (b) Potassium dichromate + sulphuric acid \rightarrow potassium sulphate + chromium sulphate + water + oxygen

Q10)(a) What do you understand by the term 'relative molecular mass of a substance' ?

(b) Calculate the relative molecular masses of:

- (i) Mg_3N_2
 (ii) $(\text{NH}_4)_2\text{CO}_3$
 (iii) $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$
 (iv) $\text{C}_{12}\text{H}_{22}\text{O}_{11}$

[Given relative atomic masses of Mg=24, C=12, O=16, N=14, H=1, Cu=63.5, S=32]

*** Percentage composition of a compound**

Percentage composition of a compound, is the percentage by weight of each element present in it.

$$\text{Percentage of an element in a compound} = \frac{\text{total wt. of the element in one molecule}}{\text{Gram molecular weight of the compound}} \times 100$$

Example:

Calculate the percentage of nitrogen in urea NH_2CONH_2

(Given : Relative atomic mass of N=14, C=12, O=16, H=1)

Solution:

Relative molecular mass of urea $\text{NH}_2\text{CONH}_2=60$

$$\text{Percentage of nitrogen} = \frac{\text{weight of nitrogen}}{\text{total weight of urea}} \times 100$$

$$= \frac{28}{60} \times 100 = 46.666 \text{ or } 46.67\%$$

Q11)(a) Calculate the percentage of potassium in Potassium chlorate, KClO_3 .

(Given relative atomic masses of K=39, Cl=35.5, O=16)

(b) Find the percentage mass of water in washing soda crystals ($\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$).

(Given relative atomic masses of Na=23, C=12, O=16, H=1)

*** Empirical formula of a compound:**

Definition: The empirical formula of a compound is the simplest formula, which gives the simplest ratio in whole numbers of atoms of different elements present in one molecule of the compound.

Example:

1. The empirical formula of hydrogen peroxide (H_2O_2) is HO. It indicates the simplest ratio (1:1) between the hydrogen and oxygen atoms in its molecule.
2. The empirical formula of acetic acid (CH_3COOH) which can also be written as $\text{C}_2\text{H}_4\text{O}_2$ is CH_2O .

Q12) Give the empirical formula of:

- (a) Benzene (C_6H_6)
- (b) Glucose ($\text{C}_6\text{H}_{12}\text{O}_6$)
- (c) Acetylene (C_2H_2)
- (d) Acetic acid (CH_3COOH)

* **Naming of acids:**

- Names of binary acids are given by adding the prefix 'hydro' and the suffix 'ic' to the name of the second element.

Example: HCl is hydrochloric acid

- Names of acids containing radicals of polyatomic groups are given on the basis of the second element present in the molecule, and the prefix 'hydro' is not used.

Example: H_2SO_4

In H_2SO_4 , the second element is sulphur, hence the name sulphuric acid.

If the number of oxygen atoms is less, then the suffix 'ous' is used instead of 'ic'.

Thus H_2SO_3 is Sulphurous acid.

- Trivial names:

There are certain compounds with names that do not follow any systematic rule. Such names are called trivial or common names, and they are widely accepted.

Example : Hydrogen monoxide or dihydrogen oxide is called water [H_2O]

Q13) Fill in the blanks:

- (a) Valency of phosphorus in PCl_3 is _____ and in PCl_5 is _____.
- (b) Formula of iron (III) carbonate is _____.
- (c) Formula of sodium meta-aluminate is _____.
- (d) Formula of magnesium chloride is _____.
- (e) In the molecule of a compound, the negative part is _____ radical and the positive part is _____ radical.
- (f) The common name of Nitrogen trihydride [NH_3] is _____.

Q14) Name the following acids:

- (a) HNO_3
- (b) HF
- (c) H_3PO_4
- (d) HNO_2
- (e) H_2CO_3
- (f) H_3PO_3

“END”