Chapter-01

Lecture-02

Some Basic Concepts of Chemistry

Class –11 **Sub-Chemistry**

Scientific notation is a form of presenting very large numbers or very small numbers in a simpler form. As we know, the whole numbers can be extended till infinity, but we cannot write such huge numbers in a piece of paper. Also, the numbers which are present at the millions place after the decimal needed to be represented in a simpler form. Thus, it is difficult to represent a few numbers in their

expanded form. Hence, we use scientific notations.

For example, 100000000 can be written as 10^8, which is the scientific notation. Here the exponent is positive. Similarly, 0.0000001 is a very small number which can be represented as 10^{-8}, where the exponent is negative.

The general representation of scientific notation is:

$a \times 10^b$; $1 \leq a < 10$

Scientific Notation Examples

The examples of scientific notation are:

$490000000 = 4.9 \times 10^8$

$1230000000 = 1.23 \times 10^9$

$50500000 = 5.05 \times 10^7$

Practice Questions

Problem 1: Convert the following numbers into scientific notation.

1. **28100000**
2. **7890000000**
3. **0.00000542**

Significant Figures

The term "significant figures" refers to the number of important single digits (0 to 9 inclusive) in the coefficient of expression in the scientific notation. The number of significant figures in the expression indicates the confidence or precision with which an engineer or scientist indicates a quantity

Significant Figures Rules

- ***All non zero digits are significant.***
- ***Zeroes between non zero digits are significant.***
- ***A trailing zero or final zero in the decimal portion only are significant.***

Following are the significant figures rules that govern the determination of significant figures:

1. **Those digits which are non-zero are significant.**
   For example, in 6575 cm there are four significant figures and in 0.543 there are three significant figures.
2. **If any zero precedes the non-zero digit then it is not significant. The preceding zero indicates the location of**

the decimal point, in 0.005 there is only one and the number 0.00232 has 3 figures.

3. If there is a zero between two non-zero digits then it is also a significant figure.
   For example; 4.5006 have five significant figures.
4. Zeroes at the end or on the right side of the number are also significant.
   For example; 0.500 has three significant figures.
5. Counting the number of objects for example 5 bananas 10 oranges have infinite figures as these are inexact numbers.

Significant Figures Examples

The numbers in boldface are the significant figures.

- 4308 – 4 significant figures
- 40.05 – 4 significant figures

- 4.00 – 3 significant figures
- 0.00500 – 3 significant figures

1. Precision

The closeness of two or more quantities to each other is called precision. The level of measurement that gives the same result when repeated.

2. Accuracy

It is the level of measurement that gives true as well as consistent results (i.e. it has no systematic and random errors). The observed results are in agreement with the true results.

Examples:-

Let us understand this concept using an experiment, suppose the true mass for a ball is 5g and Gaytri takes two measurements in an experiment and reports the masses as 4.93g and 4.95g for the same ball. This reported values are precise but not accurate.

The number of significant figures is the meaningful digits which are known with certainty. The uncertainty is specified by writing uncertain as well as certain digits. If we take the example of a number 57.4, then 57 is certain and 0.4 is the uncertainty in measurement associated with the number.