

Analytical

2-3-20

Significant Figure

50.1%, 50.08%, 50.12%

└──────────┘

51%

⇒ accuracy \pm %

All the digits necessary to report the results of an instrument or method with respect to its accuracy are called "Significant figures". It consists of all the certain digits + 1 uncertain digit. Accuracy of an instrument may be point 1% or .001%. There are certain rules to report the results in the form of significant figure.

Rules

- 1: All the non zero digits are considered significant
- 2: All the zeros leading the non-zero digits are insignificant.
- 3: All the zeros b/w the non-zero digits are significant.

4: All the trailing zeros of non zero digits may be significant or non significant depending upon the accuracy of instrument.

Examples

No. of significant figures

0.00123

= 123

1203.00

6

0012300

5

12.03000

5

Round off Rules

⇒ if the last digit of significant figures is odd or even and the trailing digit is greater than 5 then the leading digit will round off to next digit.

⇒ if the trailing digit of the last significant digit is 5 then the leading

digit will round off to even digit if it is odd but remain same if it is even.

Scientific Notation

$$2100,000 \quad 2100,001$$

$$2.100 \times 10^6 = \text{S.F. } 4$$

$$2.1 \times 10^6 = \text{S.F. } 2$$

$$2.10 \times 10^6 = \text{S.F. } 3$$

Multiplication or division

$$21.03 + 21.0 + 21.003 = \frac{63.033}{\substack{\text{S.F. } 1 \\ 03}} = 63.0$$

$$6.89 \div 2.3 = 3.33 \\ = 3.3$$

$$3.03 \times 3.0 = 9.09$$

$$\downarrow \frac{9.1}{}$$

$$\Rightarrow \frac{3.06 + 3.09 + 3.03}{3}$$

$$= \frac{3.06}{}$$

$$\frac{3.00349}{\frac{3.003}{}}$$

$$\sqrt{3.0} \\ 1.7770$$

$$\downarrow \frac{1.8}{}$$

$$\sqrt{3.00} \\ 1.78$$

$$\downarrow \frac{1.78}{}$$

$$\frac{1.78}{}$$

Rules

\Rightarrow when results are denoted in form of Scientific Notation, then the no. of significant figures is equal to the no. of digits express

before prefix. Number of digit before prefix are dependent on the precision of instrument.

⇒ When multiplication, division, addition or subtraction is perform then they results must contain the no. of significant figures is equal to the minimum number of significant figures present in the added subtractive, multiplicative or divided values.

Examples :-

Report the results of following calculations in appropriate significant figures :-

① $3.333 + 2.52 + 4.9874$

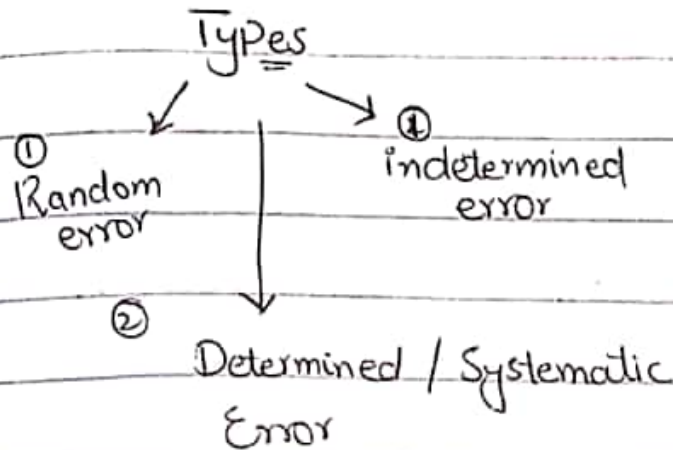
④ $8.0 \div 4.33 + 9.009$

② $3.987 \div 2.01$

③ $4.01 + 2.6 - 3.779$

AnalyticalError

difference b/w the measured value & true value.



(1) Random or indetermined error

(2) Determined / Systematic error

⇒ Due to fault in the instrument & analytical procedure.

* Not

⇒ - or + from standard value to find the accurate value

* Not fixed

* Can't determine

* Error comes in every value, because of air current, electric etc.