CHAPTER – 1 (B) Sources and Types of errors

1B.1   INTRODUCTION

Error is an action which mean mistake. In Pharmaceutical chemistry, the difference between Standard value and Observed value is called ERROR.

EXAMPLE – If the tablet contains 500mg of paracetamol and after analysis the analyst observed 490 mg of paracetamol in the tablet the Error is 10mg.

1B.2   SOURCES OF ERROR

1. **Sample Preparation:** Error may occur during preparation of sample.
2. **Error by Analyst:** Analyst can be error during analysis; It is also known as human error.
3. **Equipment Problems:** Error may occur due to improper or defective equipment.
4. **Calculation Error:** Error may occur during calculation of the results.
5. **Reporting Error:** Analyst may do error in writing reports.
6. **Error in Method Selection:** Error may occur due to wrong method in selection.

1B.3   TYPES OF ERROR

1. **Determinate Error:** Determinate is also known as systemic error. These errors are known to the analyst. These are usually one sided by pre-planning and carefully working. It can be avoided or keep at minimum.
2. **Personal Error:** These types of errors are exclusively caused due to personal mistakes or carelessness can avoid these types of error.
3. **Instrumental Error:** Instrumental error are due to defect in equipment. These are causes due to faulty apparatus.
4. **Error in Method:** Any error occurred during the method or selection of wrong method comes under the category.
5. **Indeterminate Error:** These errors are also known as non-systemic error or accidental error and Random error. The cause of random error may or may not be known.

1B.4	ACCURACY

Accuracy is a define as the closeness of a measured value to the true value. In usual practice on accurate results is the one which matches very nearly with true value of the measured amount.

1B.5	PRECISION

Precision is a defined as the variation between the standard value and measured value/observed value is high, so it is accurate but obtained value are close to each other. It shows the repeatable is called precision.

1B.6	SIGNIFICANT FIGURES

The significant figures of a given number are those significant or important digits, which convey the meaning according to its accuracy. For example, 6.658 has four significant digits. These substantial figures provide precision to the numbers. They are also termed as significant digits.

Rules for Significant Figures

- All non-zero digits are significant. 198745 contains six significant digits.
- All zeros that occur between any two non zero digits are significant. For example, 108.0097 contains seven significant digits.
- All zeros that are on the right of a decimal point and also to the left of a non-zero digit is never significant. For example, 0.00798 contained three significant digits.
- All zeros that are on the right of a decimal point are significant, only if, a non-zero digit does not follow them. For example, 20.00 contains four significant digits.
- All the zeros that are on the right of the last non-zero digit, after the decimal point, are significant. For example, 0.0079800 contains five significant digits.
- All the zeros that are on the right of the last non-zero digit are significant if they come from a measurement. For example, 1090 m contains four significant digits.

Rounding Significant Figures

A number is rounded off to the required number of significant digits by leaving one or more digits from the right.

- When the first digit in left is less than 5, the last digit held should remain constant. When the first digit is greater than 5, the last digit is rounded up.
- When the digit left is exactly 5, the number held is rounded up or down to receive an even number.
- When more than one digit is left, rounding off should be done as a whole instead of one digit at a time.

There are two rules to round off the significant numbers:

1. First, we have to check, up to which digit the rounding off should be performed. If the number after the rounding off digit is less than 5, then we have to exclude all the numbers present on the right side.
2. But if the digit next to the rounding off digit is greater than 5, then we have to add 1 to the rounding off digit and exclude the other numbers on the right side.