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Stability Indicating Analytic Method Devlompent & Validation of Hplc

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A BSTRACT:

When it comes to analysing the stability of a pharmacological product or doing quantitative and qualitative analyses of it, high-performance liquid chromatography is among the most reliable procedures. The purpose of these is to isolate and remove any traces of drug-related contaminants that may have been introduced during the production process. Strategies and difficulties related to the development of stability-indicating HPLC systems for pharmacological substances are discussed in this article. Forced degradation investigations of novel chemical entities and pharmaceutical items are necessary for the development and specificity of such a stability indicating approach.

I. AIM & OBJACTIVE

Analytical chemists utilise high pressure liquid chromatography (HPLC), an earlier name for high performance liquid chromatography, to isolate and measure individual substances in a mixture. A pressurised liquid solvent containing the sample combination is passed through a column of solid adsorbent material by means of pumps. Because of their unique interactions, the sample's constituents move through the column at varying speeds.

By using high-performance liquid chromatography (HPLC), compounds in analytical chemistry, biochemistry, and industrial chemistry may be separated. Identifying, quantifying, and purifying the different components of a mixture are the primary goals of employing HPLC.

II. INTRODUCTION

The stability-indicating methods, particularly when the little information is available about potential degradation products. These studies also provide information about the degradation pathways and degradation products that could form during storage. Stability testing of drug substance requires the accurate analytical method that quantitates the active pharmaceutical ingredients (API) without interfering from degradation products, process impurities and other potential impurities 1. International Conference on Harmonization (ICH) guidelines, the requirement of establishment of stability-indicating assay method (SIAM) has become more clearly mandated. The guidelines explain forced degradation studies under a variety of conditions, like pH, light, oxidation, dry heat, etc. and the separation of drug from degradation products. High performance liquid chromatography (HPLC) is the most accurate analytical methods widely used for the quantitative as well as qualitative analysis of drug product and used for determining drug product stability.

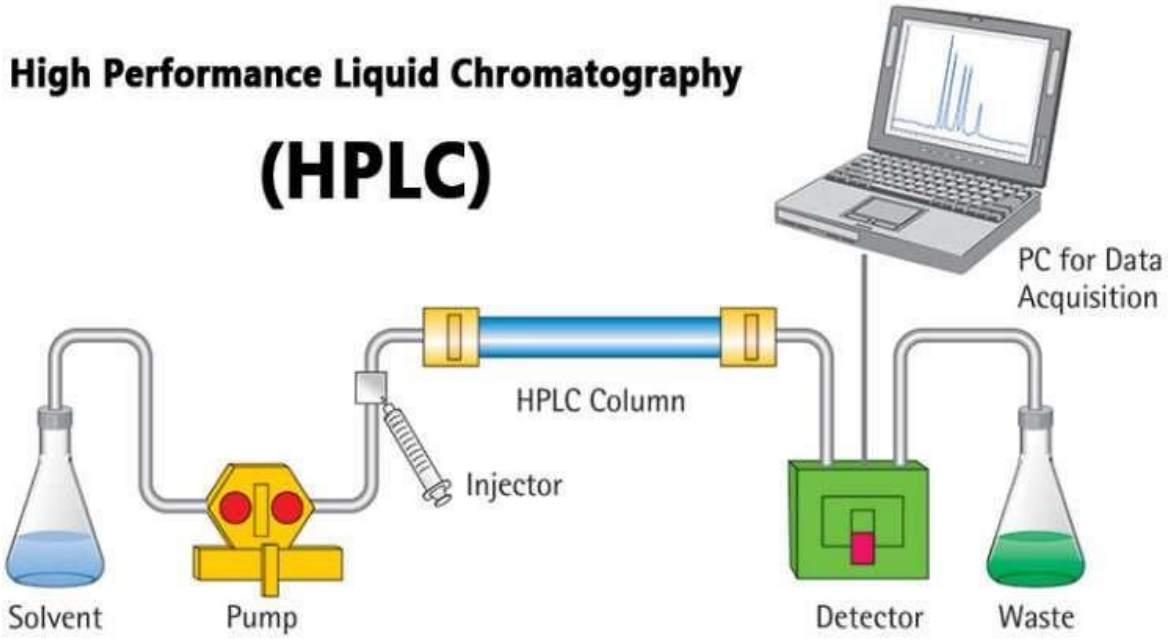

Fig-1: Flow diagram of HPLC

The official test method that result from these processes are used by quality control laboratories to ensure the identify, purity, potency & performance of drug product. The HPLC analytical chemistry deal with method for identification, separation, & quantification of the chemical components of natural & artificial material. HPLC is the major & integral analytical tool applied in a drug discovery, development, & production.

III. METHOD OF PREPARATION

STABILITY INDICATING METHOD DEVLOPMENT STRATERGIES:

STEP 1 : 1. Physiochemical properties of drug are important for method development.

2. the properties, oxidation, reduction are useful in a experimental.

3. determines the optimum PH in the m.p.

4. functional group or structure of analyte indicates potential active sites of Degradation.

STEP 2: Preparation of sample required for method development

1. The method are carried out by stressing the API condition.
2. In method stress testing is also referred as force degradation & use for provide information about degradation.
3. The degradation study performing the thrombolysis, hydrolysis & oxidation of drug.

STEP-3:- Setup preliminary HPLC condition

1. Preliminary experimental condition can be adapted from official or unofficial methods or literature review.
2. Official methods are published in (USP) united states of pharmacopoeia.
3. These method are consider validated. & can be used for stability testing.
4. Experimental conditions should be based on API & properties of drug substance.
5. Selection of column & mobile phase is importance

STEP-4:- Developing seperation of stability indicating chromatogrphic condition.

1. The most common separation variables ar temp,solvent type mobile phase ,pH etc.
2. Initial chromatograpic condition for stability indicating method are

new entity most importance to degradants use in solution separated and detected.

IMPORTANT PARAMETERS IN METHOD DEVELOPMENT.

1. Solvent type
2. Mobile phase
3. Isocratic or gradient mode
4. Coloumn temperature

VALIDATION

ANALYTICAL METHOD VALIDATION

Method validation such as the process of provided (through scientific studies) that an analytical method is suitable for its projectedusage. Method validationdelivers the method development really specific, Linear, Precise, accurate & sensitive. The required validation parameters, also called analytical performance characteristics, depend upon the type of analytical method. Allowing to ICH guideline the validation of analytical methods are outlinebelow.

Method validation is the process to confirm that the analytical procedure employed for a specific test is suitable for its intended use. Analytical method validation is the process of demonstrating that an analytical method is reliable and adequate for its intended purpose. Any method that is utilized to determine results during drug substance and formulation development will have to be validated

Parameters of Analytical Method Validation Analytical methods have been validatedin pursuance of ICH guidelines of Q2 (R1)[26]. Validation parameters are:

1. System suitability
2. Specificity
3. Linearity

4. Precision
5. Accuracy
6. LOD
7. LOQ
8. Robustness

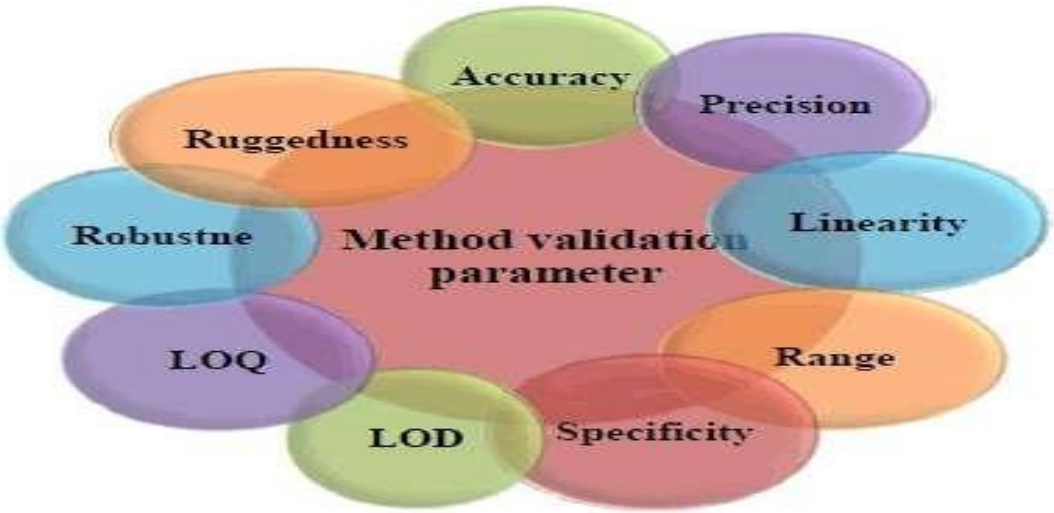

Figure 10. Validation Parameter.

1. System suitability

the industry of pharmaceuticals to choose whether a chromatographic system is being used day today in a normal way in pharmaceutical research centers where nature of results is most critical which is reasonable for an unmistakable analysis.

The parameters used in the system suitability tests (SST) report are as follows:

1. Number of theoretical plates or Efficiency (N).
2. Capacity factor (K).
3. Separation or Relative retention (α).
4. Resolution (Rs).
5. Tailing factor (T).
6. Relative Standard Deviation (RSD).

2. Specificity

Specificity alludes to the capacity of the analytical method to separate and evaluate the analyte in complex blends. An investigation of specificity is to be directed amid the assurance of contaminations and validation of identification proof tests.

3. Linearity & range

The linearity of a method is a proportion of how well an calibration plot of response versus concentration approximates a straight line. Linearity can be surveyed by performing single estimations at a few analyte concentration.

4. Precision

Repeatability: precision under same operating conditions, same analyst over a short period of time.

Intermediate precision: method is tested on multiple days, instruments, analysts etc.

5. Accuracy

The accuracy of a measurement is defined as the closeness of the measured value to the true value. In a method with high accuracy, a sample (whose "true value" is known) is analyzed and the measured value is identical to the true value.

6. Limit of detection

Limit Of Quantification is intent by the analysis of samples with studied concentration of analyze and the analyte can reliably detected, but not required quantities as precise value, under the express experimental conditions.

7. Limit of quantitation

The parameter is Similar to LOD, ICH suggest the given four methods for approximation of LOQ.

8. Robustness

The method parameters in HPLC technique may flow rate, column temperature, sample temperature, mobile phase and Ph composition.

IV. SUMMARY & CONCLUSION

The development HPLC technique is precise, specific, accurate, and stability-indicating. Validation of the method proved that the method is suitable for the analysis of the specific drug.The method is stability indicating and reliable to detect and quantify any potential degradation in the drug product during stability studies and can be used for routine quality control analysis. The method is robust enough to reproduce accurate and precise results under different chromatographic condition. The development of the analytical method for recognition, clarity, evaluation & quantification of drug has received a great deal of notice in the field of pharmaceutical analysis. This review report HPLC method development & validation in sample way.

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