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A REVIEW ON ANALYTICAL METHOD DEVELOPMENT AND VALIDATION OF ASPIRIN BY UV SPECTROSCOPY

Rutuja.D.Shembade, Banothu Bhadru, Sanjay.K. Bais
Fabtech College of Pharmacy, Sangola, Solapur, Maharashtra, India-413307

Abstract:
Aspirin chemically identified as acetylsalicylic acid, is a widely used non-steroidal anti-inflammatory drug with analgesic, antipyretic, anti-inflammatory and antiplatelet effects. Reliable analytical technique play significant role in confirming the identity, strength, purity and stability of aspirin in bulk drug substances and finished pharmaceutical products. This review describes the main principles involved in the development and assessment for aspirin, with particular attention to UV-visible spectrophotometry, while also summarizing the roles of chromatographic techniques. Method development includes selecting a suitable analytical technique, solvent, wavelength or chromatographic conditions, preparing standard solutions, establishing a calibration model and preparing dosage-form samples. Validation evaluates whether the method is suitability through characteristics such as specificity, linearity, range, accuracy, precision, detection and quantitation limits, robustness and solution stability. Because aspirin can hydrolyze to salicylic acid, stability-indicating analysis requires attention to degradation and potential interference from related substances. Current ICH guidance provides a science-based framework for developing and validating analytical procedures. This article is a literature-based review and does not report new laboratory experiments or claim newly generated validation results.

Keywords: *Aspirin; development; validation; UV; HPLC; stability-indicating method*

Corresponding author:
Dr. Banothu Bhadru,
Associate Professor,
Department of Pharmaceutical Analysis and Quality Assurance,
Fabtech College of Pharmacy, Sangola, Solapur, Maharashtra, India-413307
Mail Id: bhadru.banothu@ftccop,ac,in
Contact: +918008563398

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INTRODUCTION:

Analytical method development is constitutes a fundamental component part of pharmaceutical quality assurance. A suitable analytical procedure must generate results are use, whether the purpose is identification, assay of active pharmaceutical ingredient, impurity testing or stability assessment. This provides documented evidence that the selected procedure performs appropriately for the intended analytical application. [1, 2] Aspirin (acetylsalicylic acid, ASA) has a use long a years as an, antipyretic and anti-inflammatory medicine. At low doses, it is also used for its antiplatelet effect under appropriate clinical guidance. Its chemical and pharmaceutical analysis is important because the drug can undergo hydrolysis, producing salicylic acid. Consequently, an analytical procedure intended only to measure total ultraviolet absorbance may not always distinguish intact aspirin from its degradation products [3, 4]. Aspirin analysis, including UV-visible spectrophotometry, derivative spectrophotometry, high-performance liquid chromatography (HPLC), thin-layer chromatographic techniques and methods coupled with different detectors.

UV-visible spectrophotometry is often attractive for routine assay because the instrument is relatively accessible and the procedure can be simple. Chromatographic techniques are especially useful when aspirin must be separated from salicylic acid, other active ingredients, excipients or degradation products [3–6]. The purpose of this review is to outline a structured approach to the establishment and performance assessment of analytical procedures for aspirin, following the general organization of a UV-spectrophotometry review while incorporating relevant information about stability-indicating and chromatographic methods.

Drug profile of Aspirin

Aspirin is a widely used pharmaceutical agent whose identity, purity, strength and stability must be assessed using suitable analytical procedures.

Generic Name**:** Aspirin

IUPAC name: Acetylsalicylic acid (2-acetoxybenzoic acid)

Molecular Formula**:** $C_9H_8O_4$

Molecular Weight**:** 180.16 g/mol

pKa value: 3.5

Category**:** Non-steroidal anti-inflammatory drug (NSAID); antiplatelet agent

Appearance**:** Usually a white crystalline powder or colorless-to-white crystals

Solubility**:** Slightly soluble in water; more soluble in ethanol and some alkaline solutions

Therapeutic Use**:** Analgesic, antipyretic, anti-inflammatory and antiplatelet agent

Pharmaceutical Use**:** Used as an active pharmaceutical ingredient (API) in aspirin-containing medicines

Common Dosage Forms**:** Immediate-release tablets, enteric-coated tablets and other approved oral formulations

Structure of Aspirin

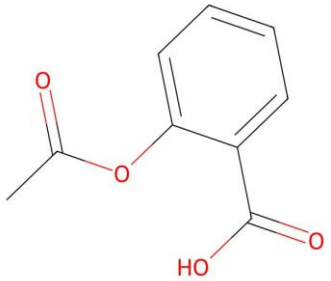

Fig. 1.Chemical Structure of Aspirin

Importance of analytical procedure in Aspirin quality assessment

Analytical technique are used at different stages of pharmaceutical development and quality control, including raw-material testing, formulation development, assay of finished products, impurity assessment and stability studies. [1, 2, 10–12].

For aspirin, hydrolysis to salicylic acid is an important analytical consideration. A direct UV measurement may be suitable for a sufficiently simple sample when interference has been assessed, whereas chromatographic separation can be preferable when aspirin must be distinguished from salicylic acid or other components [4–7, 20, 21].

Analytical validation establishes objective evidence demonstrating that the analytical approach meets the requirements of its specified application does not mean that one method is automatically suitable for every brand, dosage form, instrument or laboratory; relevant verification or revalidation may be needed when the procedure or its application changes [1, 2, 8, 9].

Principle of UV visible Spectrophotometric determination

UV-visible spectrophotometry measures the absorption of ultraviolet or visible radiation by a sample. The amount of radiation absorbed at a selected wavelength can be related to the concentration of an absorbing substance when the method conditions are controlled and the analytical response is suitable [4, 17–20].

Beer–Lambert law

The Beer–Lambert relationship is commonly expressed as:

$$A = \varepsilon bc$$

Where A is absorbance, ε is molar absorptivity, b is the optical path length and c is concentration. Under suitable conditions, absorbance is proportional to concentration. Deviations may occur because of chemical changes, instrumental limitations, high concentration, unsuitable solvent or interference from other absorbing substances [1, 2].

Where:

- A = absorbance
- ε = molar absorptivity
- b = path length of the cell
- c = concentration of the analyte

For a fixed wavelength and optical path length, absorbance is proportional to aspirin concentration within the applicable linear range [1, 2, 4].

Application to aspirin

Aspirin absorbs ultraviolet radiation because of its molecular structure. The analytical wavelength must be selected experimentally or adopted from a suitably documented published procedure after confirming that the solvent, pH, instrument and sample matrix are comparable. A single wavelength should not be assumed to be universally suitable: the observed spectrum and analytical response can change with experimental conditions. If salicylic acid or other substances absorb at the same wavelength, a simple direct UV assay may lack specificity. Derivative or multicomponent spectrophotometric approaches, or a separation technique such as HPLC, may be more appropriate [3, 4, and 6].

UV visible spectrophotometer and its components

A typical UV-visible spectrophotometer includes the following components: [4, 7]

- Radiation source: supplies UV and/or visible light suitable for the measurement range [4, 7].
- Wavelength selector or monochromatic: selects the required wavelength from the source [4, 7]
  Radiation.
- Slits and optical system: control and direct the light beam.
- Sample holder and cuvette: hold the blank or test solution; a suitable UV-transparent cell is [4, 7] required when measuring in the UV region.
- Detector: converts transmitted light into an electrical signal [4, 7].
- Signal processor/amplifier: processes the detector signal and calculates the analytical Response.
- Display or computer: presents and stores absorbance and spectral data.

Comparison of reported Analytical methods for Aspirin

Published analytical procedures for aspirin differ in analytical principle, sample preparation, sensitivity, and suitability for routine quality control. The table below is a structured comparison framework; method-specific wavelengths, ranges, and validation values should be entered only after checking the original cited papers [4–7, 17–20].

Table1. Comparison of published analytical methods for aspirin

S. No	Author / year	Technique	Medium / reagent	Wavelength / range	Reported application / result
1	Mali et al., 2015 [22]	Zero-order UV and area-under-curve (AUC) spectrophotometry	Methanol	224 nm (zero-order); 218–227 nm (AUC); linearity 5–25 µg/mL	Tablet assay; reported mean recovery 99.47% (zero-order) and 100.43% (AUC).
2	Morales-Hipólito et al., 2016 [4]	UV–Vis spectrophotometry with partial least-squares (PLS) calibration	Anhydrous alcohol; methanol examined for robustness	ASP maximum signal 275 nm; model used 13 wavelengths (236–322 nm); ASP range 30–70 µg/mL	Simultaneous estimation of aspirin and salicylic acid in tablets; reported R^2 = 0.9984 for aspirin model.
3	Patel et al., 2013 [23]	Stability-indicating RP-HPLC for aspirin and prasugrel	Acetonitrile:methanol :water (30:10:60, v/v), pH 3.0	UV detector 275 nm; aspirin linearity 15–150 µg/mL	Simultaneous assay and forced-degradation separation; reported aspirin recovery 99.34–100.32%.
	Suresh Kumar et	HPLC with UV detection	Sodium perchlorate buffer (pH	UV detector 275 nm	Aspirin assay in presence of

4	al., 2010 [7]		2.5):acetonitrile:isopropyl alcohol (85:14:1, v/v)		degradation products; chromatographic conditions and validation should be consulted in the original paper.
5	Kokot and Burda, 1998 [5]	Second-derivative UV spectrophotometry	As described in the original paper	Method-specific derivative wavelength/range; not reproduced here without full-text verification	Simultaneous determination of acetylsalicylic acid and salicylic acid in delayed-release tablets.

Analytical method development

The analytical method development discussion below is based primarily on the published stability-indicating UV–visible method of Morales-Hipólito et al. [4]. That study used partial least-squares (PLS) calibration to estimate aspirin and salicylic acid together; it should not be described as a simple single-wavelength assay. Other reported approaches are compared in Table 1.

Selection of Solvent

The solvent for aspirin analysis should dissolve the drug, have low absorbance in the selected UV region, avoid interference, and help maintain analyze stability during solution preparation. The published method selected anhydrous alcohol because aspirin can undergo hydrolysis in aqueous media. Anhydrous alcohol was used to prepare the standard solutions, tablet sample solutions, and solvent blank. Methanol was also examined in the robustness assessment and produced similar spectral patterns in the reported study [4]. Selection criteria include adequate drug solubility, minimum solvent background, reduced risk of aspirin hydrolysis, no unacceptable spectral interference, and suitability for preparing both standards and samples.

Calibration Curve

The model was then used to predict aspirin and salicylic acid concentrations in tablet samples [4]. In a conventional UV calibration curve, concentration is placed on the X-axis and absorbance on the Y-axis, and the linear relationship may be expressed as $y = mx + c$. However, the cited aspirin stability-indicating study used responses from several wavelengths together in a PLS model because aspirin and salicylic acid spectra overlap. Therefore, its reported calibration is best described as a calibration matrix/model rather than a single-wavelength straight-line curve. Do not invent absorbance readings, a regression equation, or an R^2 value; include those only if the cited source reports them or actual experimental data are available. $y = mx + c$

METHOD DEVELOPMENT

Define intended purpose and target analyte → Review literature and applicable pharmacopoeia requirements → Select analytical technique → Select solvent, sample preparation and detection conditions → Prepare standards and representative samples → Optimize method parameters → Evaluate specificity and response model → Validate relevant performance characteristics → Document procedure and acceptance criteria → Routine use with ongoing performance monitoring.

Analytical procedure validation

Analytical Validation establishes scientifically support provides documented evidence that an analytical procedure. The validation characteristics selected depend on whether the method is used for assay, impurity testing, and identity or stability assessment. ICH Q2 (R2) should be consulted and the current regulatory expectations [1].

Specificity / selectivity

Specificity refers to the capacity to determine the analyze in the presence of expected components such as excipients, impurities. For aspirin, particular attention should be paid to salicylic acid. A simple UV absorbance method should not be described as stability-indicating unless suitable evidence demonstrates that relevant degradation products do not interfere or are adequately resolved [1, 2, 4, 5, 7].

Linearity and range

Linearity indicates the extent to which an analytical procedure generates a response that is suitably related to analyze concentration over a specified interval. The range between lowest and highest concentrations for which the method has demonstrated acceptable performance. The range

should reflect the intended use and should be supported by appropriate data [1, 2, 8].

Accuracy

Accuracy expresses the closeness of the measured result to an accepted reference value. It may be evaluated using recovery studies with known additions, reference materials or comparison with a suitable independent method, as appropriate to the purpose [1, 2, 8].

Precision

Precision describes the degree of consistency among repeated measurements. Repeatability is evaluated under identical experimental conditions within a defined interval. Intermediate precision considers variations, analysts or equipment single laboratory. The study design should be appropriate to the intended use [1, 2, 8].

Detection and quantization limit

The limit of detection (LOD) represents the minimum quantity of analyze suitable accuracy and precision. The limit of quantitation (LOQ) is the lowest amount that can be quantified with appropriate performance. Their evaluation and reporting should follow a scientifically justified approach suitable for the method [1, 2, 8].

Robustness

Robustness assesses the influence of minor, deliberate variations in method conditions. Potential factors for a UV procedure can include wavelength setting, solvent composition, and pH where relevant, and time between preparation and measurement. For chromatographic methods, factors may include mobile-phase composition, flow rate, column temperature and detection conditions [1, 2, 8].

Solution stability

Solution stability evaluates whether standards and samples retain suitable analytical performance during the planned storage and analysis period. This is particularly important for aspirin because hydrolysis may change the composition of a solution. Time, temperature, solvent and storage container should be considered [4, 7, 21].

System suitability

System performance assessments confirm that the analytical system is functioning adequately before or during analysis. For UV spectrophotometry, relevant checks may include instrument performance, blank response and repeatability. For HPLC, system-suitability measures can include parameters such as retention-time consistency, peak shape, resolution and repeatability, as appropriate to the method [1, 2, 8].

Stability-indicating method and forced degradation

A stability-indicating method can measure the active ingredient without unacceptable interference from degradation products, impurities or excipients. For aspirin, hydrolysis to salicylic acid is a key consideration. Published work has described UV-spectrophotometric approaches that model aspirin and salicylic acid together, including multivariate calibration, while chromatographic methods can separate the compounds before detection [4–6].

Forced-degradation studies are designed to understand likely degradation pathways and demonstrate the selectivity of a method. Depending on the purpose and applicable guidance, studies may examine hydrolytic, oxidative, thermal and photolytic stress. Conditions should be scientifically justified and controlled; the aim is to produce informative degradation, not to create arbitrary or excessive breakdown. [21, 23].

Green analytical technique

Green analytical chemistry aims to reduce the environmental impact of analytical testing while maintaining data quality. Possible strategies include reducing solvent consumption, avoiding unnecessarily hazardous solvents, miniaturizing sample preparation, reducing waste, using energy-efficient equipment and selecting direct spectroscopic methods when they provide adequate selectivity. UV-visible spectrophotometry may have a lower solvent and material burden than some chromatographic procedures, but the overall environmental profile depends on the full procedure. A simpler method should not be selected if it cannot reliably distinguish aspirin from relevant interferents [1, 2, 9].

Comparison of analytical techniques

Analytical techniques for the estimation of aspirin and, where required, its degradation product salicylic acid. The selection should be based on the intended purpose, available equipment, composition, required selectivity and the need to monitor degradation [4–7, 17–20] .UV–visible spectrophotometer: This technique is comparatively simple and economical for routine assay. However, overlapping spectra from aspirin, salicylic acid or formulation excipients can reduce selectivity. Derivative spectrophotometer reported to address some overlapping-signal problems [4, 5, 17–19]. High-performance liquid chromatography (HPLC): HPLC separates aspirin from salicylic acid and other components before detection. It is useful when specificity and stability-indicating capability are important, although it generally requires more equipment, method optimization and mobile-phase management [7, 20]. Derivative and Chemometric UV methods: Second-derivative spectroscopy, principal-component regression,

classical least-squares and partial least-squares approaches have been reported for simultaneous analysis of aspirin and salicylic acid. Such approaches can be useful when spectral signals overlap, but the calibration model must be developed and validated using suitable mixtures and independent checks [4, 5, 17–19].No single technique is automatically best for every product. A routine assay of a simple formulation may permit a simpler procedure, whereas a stability study or a formulation containing interfering substances may require a more selective method [1, 2, 8, 9].

Factors to Consider During Method Development

1. The intended analytical purpose should be defined before selecting the technique. For example, assay of aspirin in a newly manufactured tablet, simultaneous estimation of aspirin and salicylic acid, and monitoring of degradation are related but different analytical objectives [1, 2].
2. Important development variables include solvent type and strength, solution pH where relevant, wavelength or detection conditions, sample concentration, extraction and dilution steps, filtration compatibility, solution stability, and potential interference from excipients. These variables should be assessed systematically rather than selected only by convenience [1, 2]
3. Aspirin may hydrolyze to salicylic acid and acetic acid. Therefore, standards and samples should be prepared and analyzed under controlled conditions, and the time between preparation and measurement should be considered during method development. The selected procedure should demonstrate that the measured response its intended purpose [4, 7].
4. For tablet analysis, representative sampling and complete, reproducible extraction are essential. Powdering, weighing, transfer, extraction, filtration and dilution should be described clearly so that another analyst can follow the procedure. Filter compatibility and possible analytic adsorption should be evaluated where relevant [1, 2, 4, 7].

Regulatory and Lifecycle Perspective

ICH Q14 describes science- and risk-based principles for analytical procedure development, while ICH Q2 (R2) describes the general framework for demonstrating that an analytical procedure is fit for its intended purpose [1, 2]. Together, these guidelines support a documented approach that links method development knowledge with validation evidence. The validation plan to the analytical purpose and should consider relevant characteristics such as specificity/selectivity, accuracy, precision, response and range, detection or quantitation capability where applicable, and robustness. Not every characteristic is equally relevant to every procedure; the choice should be scientifically justified [1].Analytical procedures may need verification, transfer assessment or revalidation when changes are made to the instrument, laboratory, formulation, sample preparation or intended use [1, 2].

❖ **Advantages**

- UV-visible spectrophotometer can be relatively simple and economical for routine assay [4, 22]
- The procedure can require less sample preparation than some separation-based methods [4, 22].
- A calibration-curve approach is straightforward to document and interpret.

❖ **Limitations**

- Direct UV measurement may be affected by excipients, other active ingredients or [4, 5, 17–20]

Degradation products with overlapping absorbance.

- Aspirin hydrolysis during preparation or storage can affect the measured result [4, 7, 21, 23].
- Solvent, pH, wavelength, concentration and sample preparation may influence method [1, 2, 4, 7] Performance.
- A calibration curve alone does not prove that a method is accurate, precise or specific [1, 2, 8].

A method reported for one product or instrument may not be suitable for another without [1, 2, 8, 9] appropriate verification or revalidation.

Accuracy

In a spiking study, a recovery result compares the amount found after adding a known quantity of aspirin with the quantity added, after accounting for the original sample amount where appropriate. The exact calculation must match the study design. Recovery results should be calculated from real measurements and evaluated against pre-established acceptance criteria [1, 2, 8].

% Recovery = (measured amount recovered / amount added) × 100

Precision

The standard deviation describes the spread of repeated results around their mean. Relative standard deviation expresses this spread as a percentage of the mean, allowing precision to be compared across different concentration levels. The number of replicates, units, and whether the data represent repeatability or intermediate precision should be stated [1, 2, 8].

RSD (%) = (standard deviation / mean result) × 100

Detection and Quantification limit

LOD = 3.3σ / S LOQ = 10σ / S In these commonly used estimation expressions, σ is an appropriate estimate of response variability and S is the slope of the calibration curve. The selected estimate of σ and the calculation approach should be justified for the method and data. These equations are not a substitute for demonstrating that the LOQ can be quantified with suitable performance. LOD and LOQ are especially relevant when the intended purpose involves low-level impurities or degradation products; they may not be necessary for every assay procedure [1, 2, 8].

Assay calculation concept

When a validated calibration model is used, the sample response can be converted to concentration using the inverse calibration equation:

x = (y − c) / m

The concentration calculated for the measured solution must then be adjusted for all dilution factors and the sample quantity to determine the amount of aspirin in the original sample. A final assay result may be expressed as amount per tablet or percentage of label claim. The calculation must follow the actual sample-preparation scheme and must not omit dilution factors [1, 2, 8].

Research gap

The reviewed literature shows that several approaches are available for aspirin assay, but no single analytical procedure can be presumed to meet every need across all formulations. Potential gaps include the need to demonstrate selectivity in the actual product matrix, assess aspirin hydrolysis during sample handling, and establish that a proposed method is genuinely stability-indicating when degradation products are expected.

A further practical gap is the transfer of published methods into a different laboratory or formulation. Differences in instrument configuration, solvent quality, excipient composition, sample extraction and environmental conditions may influence performance. Consequently, method verification and risk-based validation should be planned for the intended application rather than inferred from a paper's reported results.

Because this document is a literature-based review and contains no new laboratory dataset, these points are identified as areas for future evaluation, not as experimentally demonstrated findings of the present work.

Future Prospective

Future work may focus on analytical procedures that combine strong selectivity with reduced solvent use, shorter analysis time and simpler sample preparation. Chemometric and multivariate approaches may support simultaneous measurement when spectra overlap, provided that the calibration model is adequately designed and validated. Risk-based development, lifecycle management and greener sample preparation are also useful areas for continued improvement.

CONCLUSION:

Establishment and validation of analytical procedure are important for ensuring the quality and stability of aspirin in pharmaceutical products. UV–visible spectrophotometry can be a practical option for suitable formulations, while HPLC and derivative or Chemometric methods may provide additional selectivity when aspirin must be distinguished from salicylic acid or other interfering components. The final procedure should be selected according to its intended use and supported by appropriate validation evidence, without treating literature conditions as universally applicable.

REFERENCES:

1. International Council for Harmonization (ICH). ICH Q2(R2): Validation of Analytical Procedures. Step 5 guideline. 2023; effective 2024.
2. International Council for Harmonization (ICH). ICH Q14: Analytical Procedure Development. Step 4 guideline. 2023.
3. Paez Espinosa EV, Murad JP, Khasawneh FT. Aspirin: Pharmacology and Clinical Applications. ISRN Pharmacology. 2012; 2012:173124.
4. Morales-Hipólito MD, Garduño-Rosas JA, Villaseñor A, López-Arellano R. Development and validation of an alternate stability-indicating UV spectrophotometric analytical method for aspirin in tablets. Indian Journal of Pharmaceutical Sciences. 2016; 78(6):810–817.
5. Kokot Z, Burda K. Simultaneous determination of salicylic acid and acetylsalicylic acid in aspirin delayed-release tablet formulations by second-derivative UV spectrophotometry. Journal of Pharmaceutical and Biomedical Analysis. 1998; 18(4–5):871–875.
6. Franeta JT, Agbaba D, Eric S, Pavkov S, Aleksic M, Vladimirov S. HPLC assay of acetylsalicylic acid, paracetamol, caffeine and phenobarbital in tablets. Il Farmaco. 2002; 57(9):709–713.
7. Suresh Kumar S, Jamadar LD, Bhatt K, Musmade PB, Vasantharaju SG, Udupa N. Analytical method development and validation for aspirin. International Journal of ChemTech Research. 2010;2(1):389–399.
8. U.S. Food and Drug Administration. Q2 (R2) Validation of Analytical Procedures: Guidance for Industry. March 2024.

9. U.S. Food and Drug Administration. Q14 Analytical Procedure Development: Guidance for Industry. March 2024.
10. United States Pharmacopeia Convention. United States Pharmacopeia–National Formulary (USP–NF). Current applicable monograph and general chapters; consult the edition in force.
11. British Pharmacopoeia Commission. British Pharmacopoeia. Current applicable monograph for acetylsalicylic acid and relevant general methods; consult the edition in force.
12. European Directorate for the Quality of Medicines & HealthCare. European Pharmacopoeia. Current applicable monograph for acetylsalicylic acid; consult the edition in force.
13. Werz O, Stettler H, Theurer C, Seibel J. The 125th Anniversary of Aspirin—the Story Continues. Pharmaceuticals. 2024; 17(4):437.
14. Fuster V, Sweeny JM. Aspirin: A historical and contemporary therapeutic overview. Circulation. 2011; 123(7):768–778.
15. Patrono C, Rocca B. Aspirin, 110 years later. Journal of Thrombosis and Homeostasis. 2009; 7(Suppl 1):258–261.
16. Merck/Sigma-Aldrich. Acetylsalicylic acid (aspirin): product information and physicochemical properties. Molecular weight, pKa and solubility data.
17. Glombitza BW, Schmidt PC. Comparison of three new spectrophotometric methods for simultaneous determination of aspirin and salicylic acid in tablets without separation of pharmaceutical excipients. Journal of Pharmaceutical Sciences. 1994;83(5):751–757. doi:10.1002/jps.2600830532.
18. Schmidt PC, Glombitza BW. Quantitative multicomponent analysis of aspirin and salicylic acid in tablets without separation of excipients by means of principal component regression and a classical least squares algorithm. TrAC Trends in Analytical Chemistry. 1995;14(2):45–49. doi:10.1016/0165-9936(95)91471-4.
19. Sanyal AK, Dutta A. Rapid and selective ultraviolet spectrophotometric assay of aspirin in complex tablet formulations. Journal of AOAC INTERNATIONAL. 1996;79(6):1303–1306. doi:10.1093/jaoac/79.6.1303.
20. Simultaneous determination of salicylic acid and acetylsalicylic acid in bulk aspirin and in plain, buffered, and enteric-coated tablets by high-pressure liquid chromatography with UV and fluorescence detectors. Journal of Pharmaceutical Sciences. 1980; 69(10):1188–1191. doi:10.1002/jps.2600691018.
21. International Council for Harmonization (ICH). Q1A (R2): Stability Testing of New Drug Substances and Products. ICH Harmonized Tripartite Guideline; 2003.
22. Mali AD, Hake G, Bathe R. Zero order and area under curve spectrophotometric methods for determination of aspirin in pharmaceutical formulation. Indian E-Journal of Pharmaceutical Sciences. 2015;1(1). Patel SM, Patel CN, Patel MM, et al. Stability-indicating HPLC method for simultaneous determination of aspirin and prasugrel. Indian Journal of Pharmaceutical Sciences. 2013; 75(4):413–419..
23. Sena MM, Poppi RJ. N-way PLS applied to simultaneous spectrophotometric determination of acetylsalicylic acid, paracetamol and caffeine. Journal of Pharmaceutical and Biomedical Analysis. 2004; 34:27–34.
24. Verstraeten A, Roets E, Hoogmartens J. Quantitative determination by high-performance liquid chromatography of acetylsalicylic acid and related substances in tablets. Journal of Chromatography. 1987; 388:201–216.
25. Rubak P, Hardlei TF, Würtz M, Kristensen SD, and Hvas AM. Low dose acetylsalicylic acid therapy monitored with ultra-high performance liquid chromatography. Clinical Biochemistry. 2013; 46:988–992.
26. Usman S, Akram M, Shah F, Ramesh K, Islam Q. Stability indicating HPLC method for simultaneous assessment of clopidogrel bisulfate and aspirin: development and validation. International Journal of Pharmaceutical Investigation. 2023;13(2):270–278. doi:10.5530/ijpi.13.2.037.
27. Ajmeera M, Goli S, Alegete P. Stability-indicating RP-HPLC–DAD method for aspirin and vonoprazan using analytical quality by design and comprehensive greenness assessment. Journal of Chromatography B. 2026; 1281:125182. doi:10.1016/j.jchromb.2026.125182.