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High-performance liquid chromatography method for the analysis of Benzyl Alcohol

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Abstract: A rapid economical, reproducible and simple direct method was developed and validated for determination of Benzyl Alcohol using high performance liquid chromatography (HPLC). Benzyl Alcohol concentration estimated with isocratic elution using a mixture of buffer and methanol and buffer (30: 70 v/v) within 10 min, Flow rate 1.00ml, and wavelength 215nm and column C18. This method was suitable and validated for specificity, linearity, precision, accurate and ruggedness. The proposed method was successfully applied in the determinate of raw material assay for Benzyl Alcohol.

Index Terms— Accurate & stability indicating chromatography method for Benzyl Alcohol
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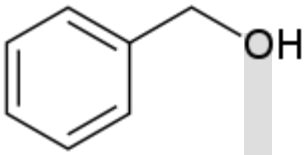
1 INTRODUCTION:



Benzyl alcohol is an aromatic alcohol with the formula $C_6H_5CH_2OH$. The benzyl group is often abbreviated "Bn", thus benzyl alcohol is denoted as BnOH. Benzyl alcohol is a colorless liquid with a mild pleasant aromatic odor. It is a useful solvent due to its polarity, low toxicity, and low vapor pressure. Benzyl alcohol is partially soluble in water (4 g/100 mL) and completely miscible in alcohols and diethyl ether.

Benzyl alcohol is produced naturally by many plants and is commonly found in fruits and teas. It is also found in a variety of essential oils including jasmine, hyacinth, and ylang-ylang.[1]
It is also one of the chemical compounds found in castoreum. This compound is gathered from the beaver plant food.[2]
Benzyl alcohol is prepared by the hydrolysis of benzyl chloride using sodium hydroxide:
$C_6H_5CH_2Cl + NaOH \rightarrow C_6H_5CH_2OH + NaCl$
It can also be prepared via a Grignard reaction by reacting phenylmagnesium bromide (C_6H_5MgBr) with formaldehyde, followed by acidification
Benzyl alcohol is used as a general solvent for inks, paints, lacquers, and epoxy resin coatings [3].It is also a precursor to a variety of esters, used in the soap, perfume, and flavor industries. It is also used as a photographic developer.

Benzyl alcohol is used as a bacteriostatic preservative at low concentration in intravenous medications, cosmetics and topical drugs. The use of benzyl alcohol as a 5% solution has been approved by the U.S. FDA in the treatment of head lice in children older than 6 months and in adults.[4]

Benzyl alcohol is only a mild acute toxin with an LD50 of 1.2 g/kg in rats.[5] It oxidizes rapidly in healthy individuals to benzoic acid, conjugated with glycine in the liver, and excreted as hippuric acid. Very high concentrations can result in toxic effects including respiratory failure, vasodilation, hypotension, convulsions, and paralysis.
Benzyl alcohol is toxic to neonates, it is associated with the gasping syndrome.[6][7].

Benzyl alcohol has been reported to cause skin allergy.[8].

Benzyl alcohol is severely toxic and highly irritating to the eye.[5] Pure benzyl alcohol produces corneal necrosis.[9].

Benzyl alcohol is not considered to be a carcinogen and no data are available regarding teratogenic or reproductive effects.[5]

No chromatography method is available for determination Benzyl Alcohol assay in raw material. At present all pharmacopeia i.e., United state Pharmacopeia USP 34 [10],

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British Pharmacopeias 2014 [11] and Indian Pharmacopoeia [12] having potentiometric titrimetry methods.

2 EXPERIMENTAL:

2.1 Reagent & chemical:

All the employed solvent were of HPLC grade and were obtained from Merck. All other chemicals were analytical-reagent grade and deionized water was used to prepare solution.

HPLC system consisting pump, UV detector, auto sampler software for the detection. Column used 250 x 4mm, RP 18, 10 microns. Chromatographic condition is as follows.

2.2 Chromatographic condition:

a) Flow rate : 1.0 ml /min.
b) Detection : 215 nm.
c) Application : 20 µl
d) Run Time : 10 min,

2.3 Mobile Phase:

Mix Methanol and 0.02M Phosphoric acid (70:30) filter through a membrane filter of 0.2 micron and degas it with ultrasonic bath for 5 to 10 minutes.

Preparation of 0.02 M Phosphoric Acid:
Dilute 1.36 ml Orthophosphoric acid to 1000 ml with water.

2.4 Standard Preparation:

Weigh accurately about 20.0 mg Benzyl Alcohol in 100 ml volumetric flask. Add 50 ml of the mobile phase. Sonicate it for 5 minutes and dilute up to mark with mobile phase.

Pipette out 25 ml of above solution in 100 ml volumetric flask and make up the volume to the mark with Mobile phase and mix.

2.5 Sample Preparation:

Weigh accurately about 20.0 mg Benzyl Alcohol in 100 ml volumetric flask. Add 50 ml of the mobile phase. Sonicate it for 5 minutes and dilute up to mark with mobile phase.

Pipette out 25 ml of above solution in 100 ml volumetric flask and make up the volume to the mark with Mobile phase and mix.

2.6 Procedure for injection:

Separately inject equal volume of about 20µl of blank, standard solution in five replicate and sample solution in duplicate, into the equilibrated HPLC system, record the chromatograms and measure the response of the peaks due to Benzyl alcohol.

2.7 System suitability:

The system is suitable for analysis if,
Relative standard deviation for five replicate injections of both standard preparations is not more than 2.0%.

2.8 Calculation :

Calculate the amount of Benzyl Alcohol in %w/w by using following

Formula:

$$= \frac{\text{Sample Area}}{\text{Standard Area}} \times \frac{\text{Weight of Standard in mg}}{\text{Weight of Sample in mg}} \times \frac{\text{\% Potency of standard (as such)}}{100} \times 100$$

3 METHOD VALIDATION [13], [14] [15]

3.1 Precision:

The precision was tested with 5 repeated injection of Benzyl Alcohol standard solution. The relative standard deviation (RSD) is less then 2.0% . The reproducibility of the chromatographic separation was very good as shown by the very narrow window of the retention time.

3.2 Specificity:

Initially blank sample without Benzyl Alcohol inject. No peak observed in blank solution. Benzyl Alcohol Standard Inject and peck was observed at 4.0 retention time (RT). No interference of any peck and pack purity is 100%.

3.3 Accuracy:

Initially blank sample without Benzyl alcohol were injected for the know any interference. working standard was used for the accuracy testing. Compared sample Benzyl alcohol against working standard. The retention time of Std. is 4.033 & sample retention time is 4.067. Assay is 99.99% against the standard.

3.4 Recovery:

The recovery was tested & it observed that recovery is about 99.86%

3.5 Linearity:

Under the above-described optimum conditions, the calibration curve obtained with standard showed

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good linear relationship in the interval 20 pm to 80 ppm. The correlation coefficient was observed 0.9994 for the calibration curve.

3.6 Robustness:

Flow rate change:

Flow rate was change 0.8ml/min, 1.0ml/min, 1.2ml/min and check the effect on assay of Benzyl Alcohol . No variation was observed in assay due to this change.

Wavelength change:

Wave length was change 210nm, 215nm, 220nm check the effect on assay of propyl paraben. No variation was observed in assay due to change in wavelength.

4 Conclusion:

This work presents a simple and validated HPLC method for the determination of Benzyl Alcohol. The method was validated showing satisfactory data for all parameters tested. Thus, it offers advantages over other analytical methods due to its rapidity, simplicity and lower cost.

Reference:

[1] The Merck Index: An Encyclopedia of Chemicals, Drugs, and Biologicals (11th ed.), Merck, 1989, ISBN 091191028X , 1138.

[2] The Beaver: Its Life and Impact. Dietland Muller-Schwarze, 2003,

[3] Benzyl alcohol, chemicalland21.com .

[4] . Prescribing Information for Ulesfia Lotion, Sciele Pharmaceuticals, Inc., April 2009, retrieved 2009-08-29 .

[5] Friedrich Brühne; Elaine Wright (2007), "Benzyl Alcohol", Ullmann's Encyclopedia of Industrial Chemistry (7th ed.), Wiley, pp. 7–8

[6] Carl R. Baum (2008), "Examples of mass exposures involving the pediatric population", in Jerrold B. Leikin; Frank P. Paloucek, Poisoning and Toxicology Handbook (4th ed.), Informa, p. 726

[7] Juan Gershanik et al. (1982), "The gasping syndrome and benzyl alcohol poisoning.", N Engl J Med307: 1384–8, doi:10.1056/nejm198211253072206

[8] EJ Curry; EM Warshaw (2005), "Benzyl alcohol allergy: importance of patch testing with personal products.", Dermatitis (16): 203–8

[9] Swarupa G Kulkarni; Harihara M Mehendale (2005), "Benzyl Alcohol", Encyclopedia of Toxicology 1 (2nd ed.), Elsevier, pp. 262–264

[10] United state Pharmacopeia USP 37, NF 32 2014.

[11] British Pharmacopeias 2014.

[12] Indian Pharmacopoeia 2010.

[13] International Conference on Harmonization (ICH) Harmonised Tripartite Guideline (1996) Step 4 version, Parent Guideline dated 27 October 1994, (Complementary Guideline on Methodology. dated 6 November 1996 incorporated in November 2005)

[14] United state Pharmacopeia USP 34, Validation of Compendial Procedure 1225.

[15] British Pharmacopeias, Validation of Analytical Procedure SC III F Volume V.