



Determination of Organic Volatile Impurities in Twenty-Three Different Coated Tablet Formulations Using Headspace Gas Chromatography with Flame Ionization Detection Technique

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ABSTRACT:

Organic solvents are extensively used in manufacturing processes of pharmaceutical formulations that cannot be completely eliminated from the product due to physical and chemical barriers. These solvents have no therapeutic value and may be toxic to human body if intake exceeds the permitted daily exposure. Therefore, a simple and sensitive method for simultaneous determination of methanol, acetonitrile, methylene chloride, n-hexane, cyclohexane, xylene, chloroform, nitromethane, toluene and pyridine was developed and validated. Separation was achieved on HP-Innowax polyethylene glycol gas chromatographic column (30 m × 250 μm × 0.25 μm) using Agilent 7890B gas chromatograph equipped with Agilent 7697A headspace auto-sampler and flame ionization detector. Twenty-three marketed coated tablet formulations (containing diclofenac sodium, Loratadine or montelukast sodium as active ingredient) were tested for the presence of volatile organic impurities using this method. Excellent results were obtained, within the globally accepted validation reference values, particularly taking into account the low concentration levels were investigated in twenty-three coated tablet formulations.

Introduction :

RS do not provide any therapeutic benefit and should be removed to the maximum possible level fulfilling quality based requirements as per ICH guideline which is one of the standards to control quality and purity of the pharmaceutical substance, excipients and drug products . During manufacturing, tablet coating processes require use of organic solvents like methanol, methylene chloride or acetonitrile. In order to obtain a high-quality tablet coating it should be dried immediately. From this point of view, organic solvents are unquestionably better than water because they evaporate quicker. However, after drying some amounts can remain in a drug product . The organic solvents differ in molecular weight, polarity and volatility

Methodology:

During manufacturing, tablet coating processes require use of organic solvents like methanol, methylene chloride or acetonitrile. In order to obtain a high-quality tablet coating it should be dried immediately. From this point of view, organic solvents are unquestionably better than water because they evaporate quicker. However, after drying some amounts can remain in a drug product . The organic solvents differ in molecular weight, polarity and volatility. For complex matrices like coated tablets, headspace sampling is the simplest, fastest and cleanest method . In the present study, the Agilent's automatic headspace sampler was used for analysing residual solvents. This headspace sampler heats the vial and gas phase is equilibrated with liquid phase. Vaporized sample from the headspace of vial is injected into the inlet of GC by the headspace auto-sampler. This process occurs at temperature and pressure above ambient conditions. This technique is simple, relatively inexpensive and minimizes the formation of artifacts. Experimental Methods Instruments and materials An Agilent 7890B Gas Chromatograph (GC) with 7697A Headspace auto-sampler was used in method development and validation

Conclusion :

To the best of author's knowledge, scanty literature is available regarding multiple solvents exposures. In current study, multiple solvents were detected in most of tablets such as four organic volatile impurities (n-hexane, cyclohexane, methanol, methylene chloride) Page 4 of 4 Citation: Latif A, Makhdoom HS, Imran M, Mazhar M, Anwar E (2017) Determination of Organic Volatile Impurities in Twenty-Three Different Coated Tablet Formulations Using Headspace Gas Chromatography with Flame Ionization Detection Technique. Pharm Anal Acta 8: 553. doi: 10.4172/2153-2435.1000553 Volume 8 • Issue 8 • 1000553 Pharm Anal Acta, an open access journal ISSN: 2153-2435 were found in samples # 3, 7 and 9, three solvents (n-hexane, cyclohexane, methanol) were detected in samples # 2, 4, 5, 10 and 15. Similarly two residual solvents (methylene chloride, methanol) were found in samples # 1, 6, 8, 11, 17, 19 and 23. Although these organic solvents lie within allowable limits but their combined effect may have toxic consequences over long-term exposure. Furthermore, dosage regimes of these tablets are usually twice or thrice a day, in this scenario chance of detrimental outcomes due to exposure to organic impurities may also increase..

Keywords:

: Volatile organic impurities; Headspace; Coated tablets; Gas chromatograph; Flame ionization detector Introduction Residual Solvents (RS), or Organic Volatile Impurities