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Review On Pharmaceutical Scope and Estimation of Impurities

Manoj Kumar S*, Pramila T, Poojashree P, Senthil kumar GP

Department of Pharmaceutical Chemistry, Bharathi College of Pharmacy, Bharathi Nagara, K.M.Doddi, Maddur Taluk, Mandya District, Karnataka, India – 571 422

ABSTRACT

In pharmaceutical products the presence of impurity assures the quality. It is important to identify potential source of impurities. Estimation of impurities is done by variety of chromatographic and spectroscopic techniques either alone or combination with other techniques. These different methods for detecting and characterizing impurities with IR, TLC, HPLC, MASS, NMR, HPTLC etc.

Keywords: Quinapril, Estimation, Impurities.

*Corresponding Author Email: Manojsgowda0308@gmail.com

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INTRODUCTION

Impurities in pharmaceuticals are unwanted chemicals that remain with the APIS or develop during formulation or develop upon ageing of APIS. The safety of a drug product is not only dependent on the toxicological properties of the active pharmaceutical substances but also the impurities formed during the different chemical transformation. The safety of the drug is closely related to the quality of the drugs, the aim of the estimation of the impurities are to minimize the adverse effect of drug materials and preparation made thereof. The active ingredient impurities are determined by selective High performance liquid chromatography and nonselective UV Spectrometry method. The identification of impurities with their structure and toxicity level is essential and mandatory in various pharmacopeias and ICH guidelines. Identification and quantification of impurities has gained utmost importance in pharmaceutical ingredients. It became a mandatory requirement in different pharmacopeias such as BP, EP, USP.

Estimation methods:

The impurities can be estimated by following methods

1. Spectroscopic method
2. Separation method
3. Isolation method
4. Hyphenated method

Spectroscopic method:

The UV, IR, MS, NMR and Raman spectroscopy methods are used for characterizing the impurities.

- **UV**-at a single wavelength provide minimal selectivity of analysis with the availability of diode array detectors, It is now possible to get information at different wavelength to ensure greater selectivity.
- **IR**-It provides specific information on some functional group that may allow quantification and selectivity.
- **NMR**-NMR provides detailed structural information on a molecule and is a very useful method for characterizing impurities.
- **MS**-Mass spectroscopy provides structural information and based on resolution of the instrument and it may also differentiate the molecules based on the molecular weight.

Separation method:

The capillary electrophoresis, Chiral separation, Gas chromatography, Supercritical fluid chromatography(SFC), TLC, HPTLC, HPLC are used for separation of impurities and degradation products.

Isolation methods:

In this method the chromatographic techniques are used for isolation of impurities along with non chromatographic techniques are also rarely used. These methods are necessary to isolate impurities because the instrumental methods mentioned above are not available or further confirmation is needed.

The method have been used for isolation of impurities as follows

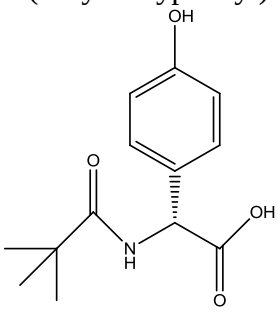
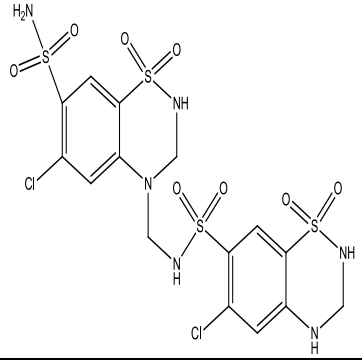
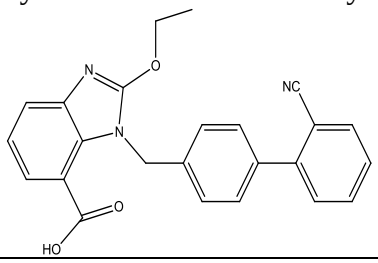
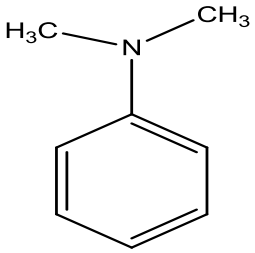
- Solid Phase Chromatography
- Flash Chromatography
- TLC
- GC
- HPLC
- Capillary Electrophoresis
- Super critical fluid extraction
- Column chromatography
- Liquid-liquid extraction

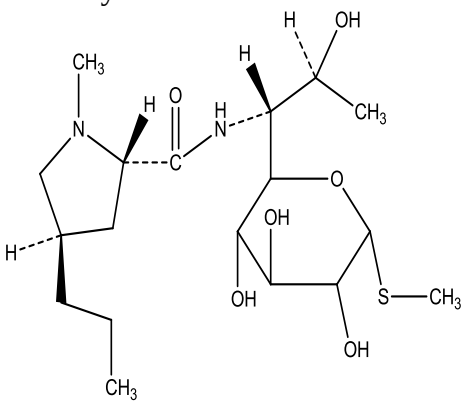
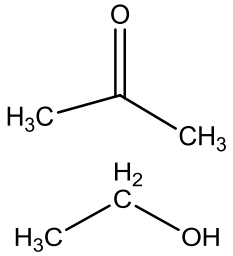
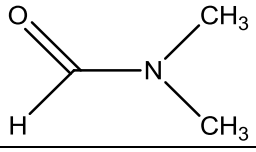
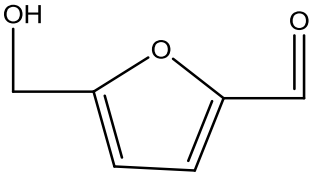
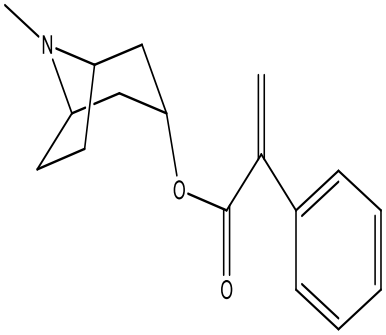
Hyphenated methods

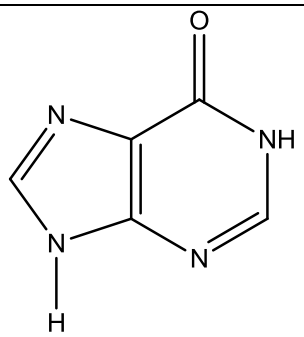
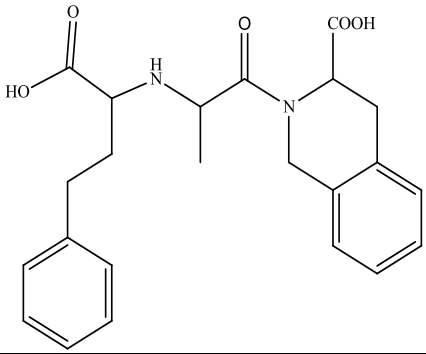
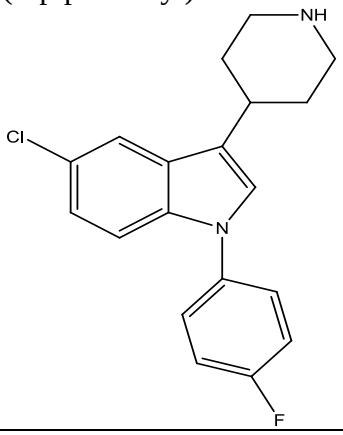
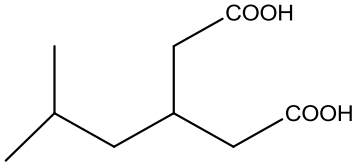
- LC-MS-MS
- HPLC-DAD-MS
- HPLC-DAD-NMR-MS
- GC-MS
- LC-MS

An example of reverse-phase LC-MS analysis in gradient elution with two different ionization techniques like Atmospheric pressure ionization with electrospray source(API-ESI) and the chemical ionization.

HPLC-DAD-MS: HPLC coupled with a diode array detector and a mass spectrometer, and such other techniques are almost routinely used.

Drug	**Impurity**	**Estimation method**	**Reference**
Amoxicillin	(2R)-2-[(2,2-dimethylpropanoyl) amino]-2-(4-hydroxyphenyl)aceticacid 	HPLC and LC-MS	5
Hydrochlorthiazide	Hydrochlorthiazide dimer impurity 	RP-HPLC	6
Azilasartan medoximil	1-[(2cyanobiphenyl-4-yl)methyl]-2-ethoxybenzimidazole-7-carboxylate 	UV and HPLC	7
Cloxacillin	N,N dimethyl aniline 	Gas Chromatography	8
Amhoterecin B	Tetraenes 	UV spectroscopy	8

Lincomycin	(2S)-4-Depropyl-4-propylidine Lincomycin 	Capillary electrophoresis	9
Doxorubicin Hydrochloride	Acetone and ethanol 	GC	10
Fluorescene sodium	Dimethyl formamide 	GC	10
Dextrose	5 Hydroxy methyl furfural 	UV spectroscopy	10
Atropine sulphate	Apo atropine 	UV spectroscopy	11
Mercaptopurine	Hypoxanthine	UV spectroscopy	12

			
Quinapril	Quinaprilat 	UV spectroscopy	13
Seretindole	5-chloro-1-(4-flurophenyl)-3-(4-piperidenyl)-1H-indol 	HPLC and LC-MS	14
Pregablin	3-isobutylglutaric acid 	LC-MS	15

CONCLUSION:

By this review article we conclude that the impurity profiling plays a important role in maintaining biological safety, purity, and efficacy of the drug product. Many instrumental methods are used to isolate and estimate and quantify the impurities, Thus impurity profiling act as a quality control tool. By using different chromatographical and non chromatographical methods impurities were estimated.

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