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Editorial

The Utilization of 3-Methylbenzthiazolinone-2(3H)-Hydrazone as a Chromogenic Reagent in Pharmaceutical Analysis

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Pharmaceutical analysis is a term that encompasses various analytical problems which visible spectrophotometric technique has found widespread applications. Some of such applications include: determination of identity and purity of starting materials used in production of drug dosage forms, identification and quantification of the active ingredients in bulk and pharmaceutical drug products, evaluation of content of uniformity for pharmaceutical drug products, determination of drug degradation rates and determination of drugs and metabolites concentrations in body fluids.

A chromogenic reagent is a chemical substance or compound that is added to a system in order to bring about a chemical reaction (colored end product). In pharmaceutical analysis, various chromogenic reagents are routinely used in qualitative and quantitative analysis of pharmaceuticals. Some of the most often used chromogenic reagents in drug determinations are 1, 2-naphthoquinone-4-sulfonic acid sodium, 2,4- dinitrophenyl hydrazine, 2,3,5-triphenyltetrazolium, 2,4,6-tripyridyl-S- thiazine, 4-dimethyl amino benzaldehyde chloranil, chloranilic acid, iodine, Folin ciocalteu (a mixture of sodium tungstate and sodium molybdate) and 3-methylbenzothiazolinone-2-hydrazone (MBTH).

The chemical substance, 3-methylbenzthiazolinone-2-hydrazone (MBTH) is one of the most versatile chromogenic reagents employed in visible spectrophotometric analysis of chemical substances including pharmaceutical active agents. It was originally introduced as a reagent for aldehyde. However, its use was later extended to a variety of organic compounds such as aromatic amines, arylalkylamines, aryldialkylamines, carbazoles, indoles, phenothiazines, phenols, compounds having methylene groups and different N- and S- heterocyclic compounds. The hydrochloride salt of the reagent is used in the form of an aqueous solution and the reaction products can be extracted into chloroform, if considered to be necessary.

The MBTH reagent reacts with its substrates mainly by oxidative coupling reaction in the presence of oxidizing agent such as ferric chloride. The oxidant oxidizes the reagent to form an electrophilic intermediate by losing two electrons and one proton. The electrophilic intermediate forms green colored chromogen by coupling with the most nucleophilic site of the drug molecule. The absorbance of the green colored chromogen is usually measured at visible wavelength of 600 nm to 670 nm.

Pharmaceutical analysts exploiting the reacting property of this reagent have quantitatively determined the purities of pharmaceutical active agents in bulk and pharmaceutical formulations. For instance, the quantitative determination of antidepressants (amitriptyline HCl, doxepin HCl, nortriptyline HCl), antiviral (acyclovir, ganciclovir), antibacterial (ceftazidime and cefradoxil), muscle relaxant (metaxalone) and oral anticoagulant (dabigatran etexilate).

In addition to the pharmaceutical applications, MBTH has been utilized to determine any of the above-mentioned chemical compounds (aldehyde, aromatic amines, phenols etc.) in reaction rate kinetics, automobile exhausts, dinking surface and saline waters, domestic and industrial wastes.

In conclusion, analytical methods developed and validated using MBTH as a chromogenic reagent have found wide applicability in the field of pharmaceutical analysis for routine quality control of pharmaceutical active agents in bulk and pharmaceutical formulations. This is so because these analytical methods have shown to be rapid, simple, convenient, accurate and highly sensitive in the determination of chemical substances or pharmaceutical active agents in various sample matrices.

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