Column Performance Study of Different Variants of Liquid Chromatographic Technique: An Application on Pharmaceutical Ternary Mixtures Containing Tetrayzoline

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Abstract

High-performance liquid chromatography (HPLC), ultra-performance liquid chromatography (UPLC) and rapid resolution liquid chromatographic (RRLC) methods have been developed and validated for the separation and quantitation of both or either of two ternary mixtures present in ophthalmic solutions. The first mixture contains chloramphenicol, dexamethasone sodium phosphate and tetrazyzline HCl (TZH); while the second one contains ofloxacin, prednisolone acetate and TZH. Both preparations contain benzalkonium chloride as a preservative. The columns used were a HPLC column (C18 5 µm particle size), a RRLC column (C18 2.6 µm particle size) and a UPLC column (C18 1.7 µm particle size). A comparative study was conducted to illustrate the effect of the change in column particle size and dimensions on the other chromatographic conditions, backpressure and the separation of both ternary mixtures. The methods were validated as per ICH guidelines where accuracy, repeatability, interday precision and robustness were found to be within the acceptable limits. The RRLC column provided shorter run time and better resolution than HPLC, while the UPLC column gave the shortest run time for all columns. The RRLC column resulted in minimum backpressure, so it could be used with any HPLC instrument, which makes the method more practical and economic. The results obtained from the proposed methods were statistically compared with official ones where no significant difference was observed.

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