Chapter 9: Summary

Various methods including Spectrophotometric, HPLC, HPTLC, LC-MS, LC-MS/MS etc. were reviewed for the estimation of Glipizide, Gliclazide, Glimepiride, Metformin Hydrochloride, Pioglitazone Hydrochloride, Rosiglitazone Maleate, Sitagliptin Phosphate and Vildagliptin in individual and pharmaceutical dosage form.

HPTLC methods were developed for simultaneous estimation of Metformin Hydrochloride and Gliclazide; Metformin Hydrochloride and Glipizide; Metformin Hydrochloride and Pioglitazone Hydrochloride; and Metformin Hydrochloride and Sitagliptin phosphate in pharmaceutical dosage form. The developed methods were validated for linearity, accuracy, method precision, intra – day precision, inter – day precision, LOD and LOQ parameters.

RP – HPLC methods were developed for simultaneous estimation of Metformin Hydrochloride and Gliclazide; Metformin Hydrochloride, Glimepiride and Rosiglitazone Maleate; and Metformin Hydrochloride and Vildagliptin in pharmaceutical dosage form. The developed RP – HPLC methods were validated for linearity, accuracy, method precision, intra – day precision, inter – day precision, LOD, LOQ, robustness, solution stability and system suitability parameters.

Stability Indicating RP – HPLC methods were developed for simultaneous estimation of Pioglitazone Hydrochloride and Glimepiride; and Rosiglitazone Maleate and Gliclazide in pharmaceutical dosage form. In the present study, comprehensive stress testing was carried out according to ICH guideline Q1A (R2). The specificity of the methods was determined by stress testing of the drug (forced degradation). Drugs were subjected to acid hydrolysis, base hydrolysis, oxidation and dry heat to apply stress conditions. Specificity of the methods was established by determining the peak purity of the peaks of the drugs in a stress samples using PDA detector. All the hydrolyzed products were well separated from the drug. The developed methods were successfully applied to determine the drugs in the presence of their degraded products.
Absorption Correction Method was developed for simultaneous estimation of Gliclazide and Rosiglitazone Maleate in combination. Rosiglitazone Maleate shows $\lambda_{\text{max}}$ at 312 nm where Gliclazide was not showing any absorbance. Hence 312 nm was selected as detection wavelength for Rosiglitazone Maleate and 274 nm was selected as detection wavelength for Gliclazide where absorption of Rosiglitazone Maleate is corrected.

Simultaneous Equation Method was developed for simultaneous estimation of Gliclazide and Rosiglitazone Maleate in combination. In simultaneous equation method the absorbance was measured at $\lambda_{\text{max}}$ of both the drugs and absorptivities were calculated at both the wavelength. Overlain spectra of Gliclazide & Rosiglitazone Maleate in methanol indicates that Gliclazide shows $\lambda_{\text{max}}$ at 247.4 nm and Rosiglitazone Maleate shows $\lambda_{\text{max}}$ 274 nm. Hence these two wavelengths were selected for estimation of both the drugs by Simultaneous Equation Method. Since difference in $\lambda_{\text{max}}$ of both drugs is more than 20 nm, simultaneous equation method can be conveniently applied for estimation of these drugs.

Both spectrophotometric methods were validated for linearity, accuracy, method precision, intra – day precision, inter – day precision, LOD, LOQ and solution stability parameters.

All the developed methods were successfully applied to determine the drugs in pharmaceutical preparation.