

SUPPLEMENTARY MATERIAL TO
**Forced degradation studies and structural characterization of
related substances of bisoprolol fumarate in finished drug
product using LC–UV–MS/MS**

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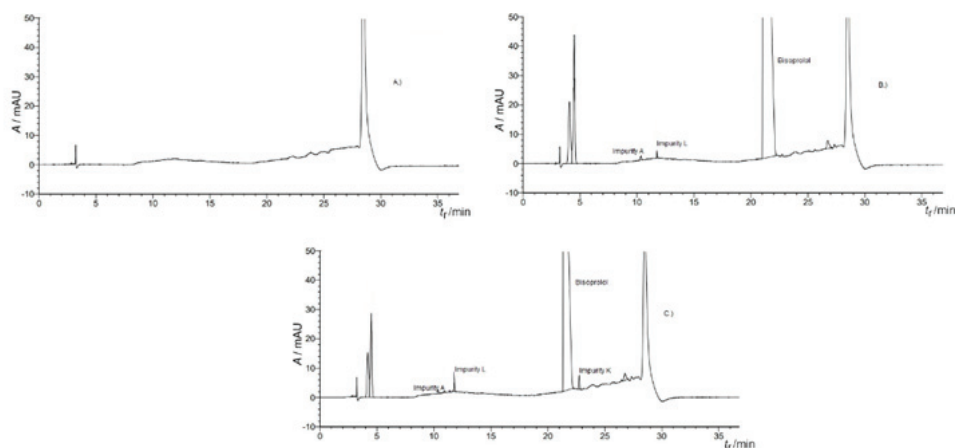


Fig. S-1. Chromatograms of: A) placebo solution, B) test solution, and C) standard solution obtained with the developed alternative method.

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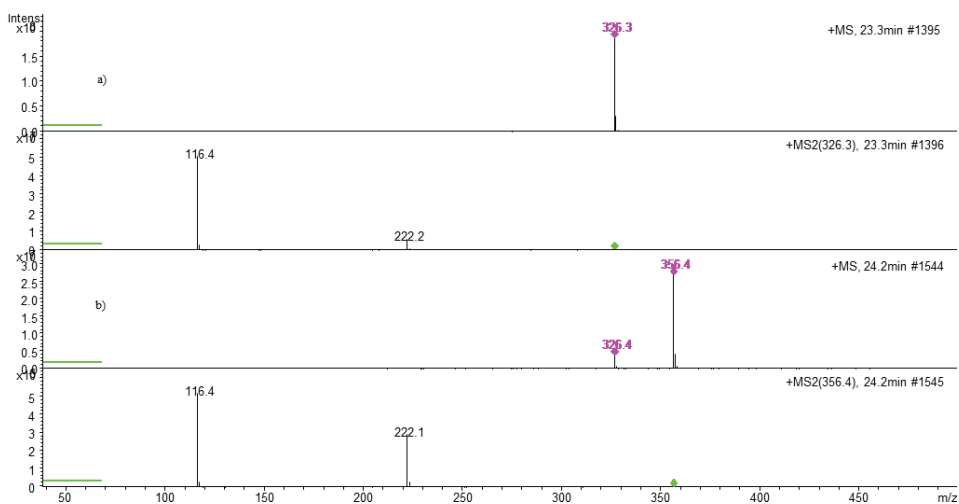


Fig. S-2. MS/MS² of a) bisoprolol, b) bisoprolol impurity G.

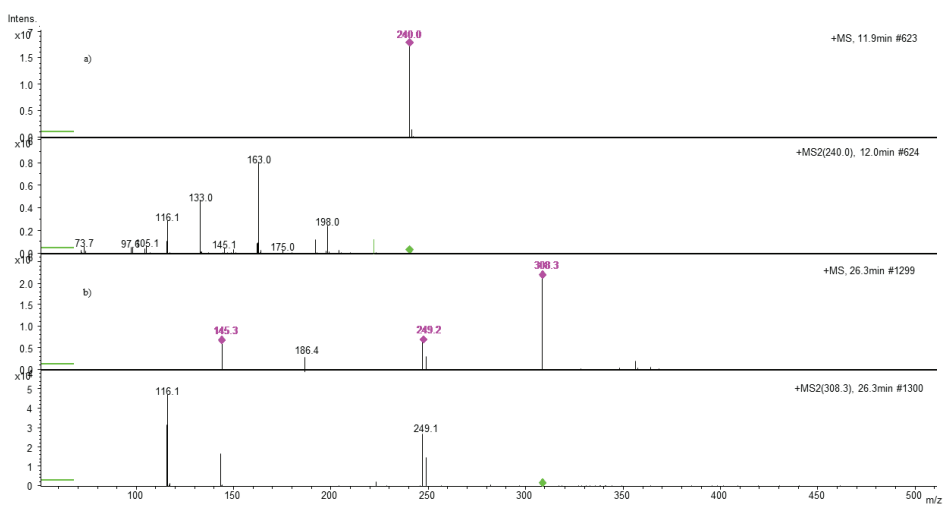


Fig. S-3. MS/MS² of a) bisoprolol impurity A, b) bisoprolol impurity E.

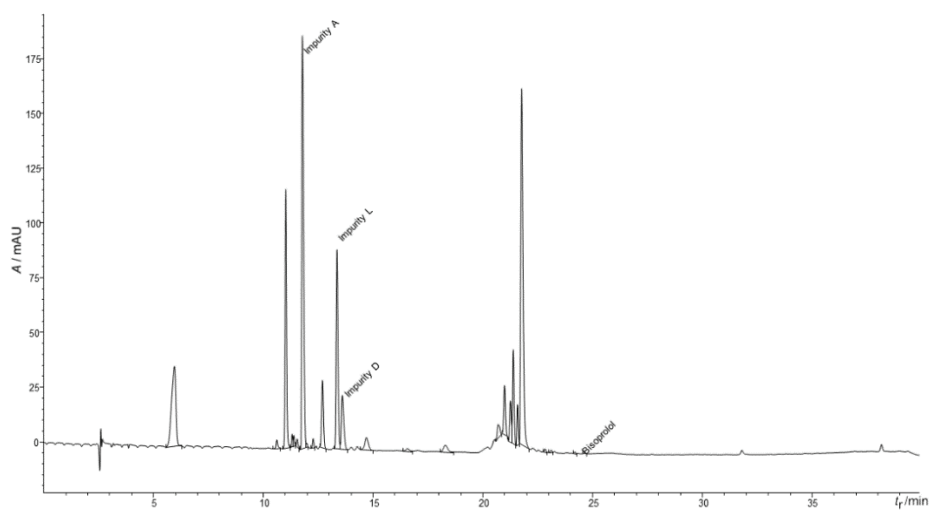


Fig. S-4. Chromatogram of test solution – acid degradation.

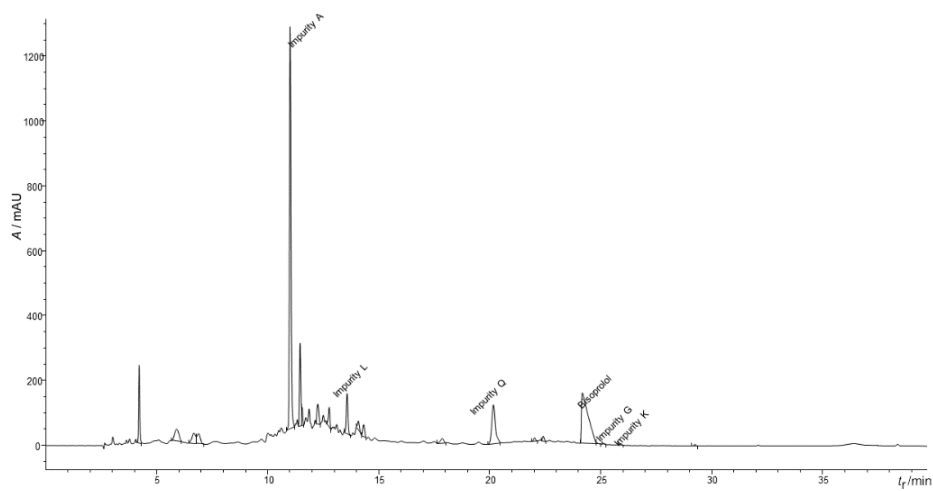


Fig. S-5. Chromatogram of test solution – alkaline degradation.

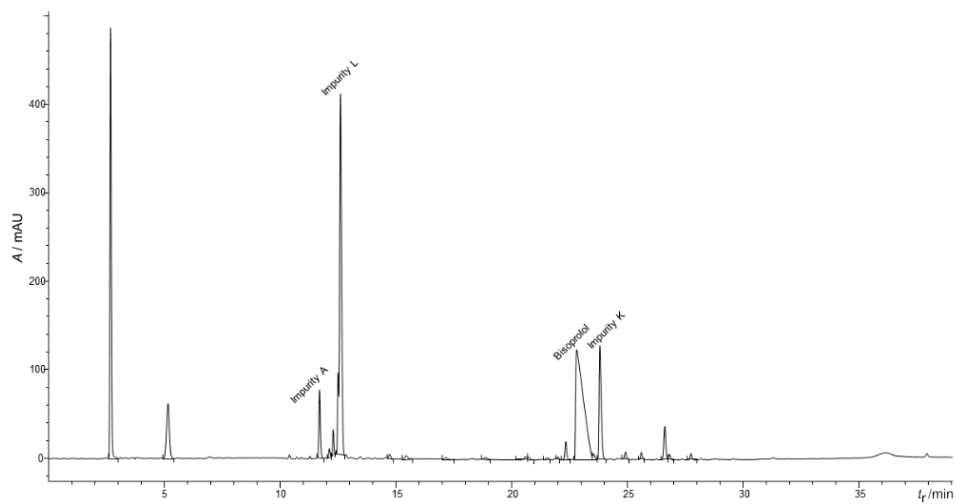


Fig. S-6. Chromatogram of test solution – oxidative degradation.

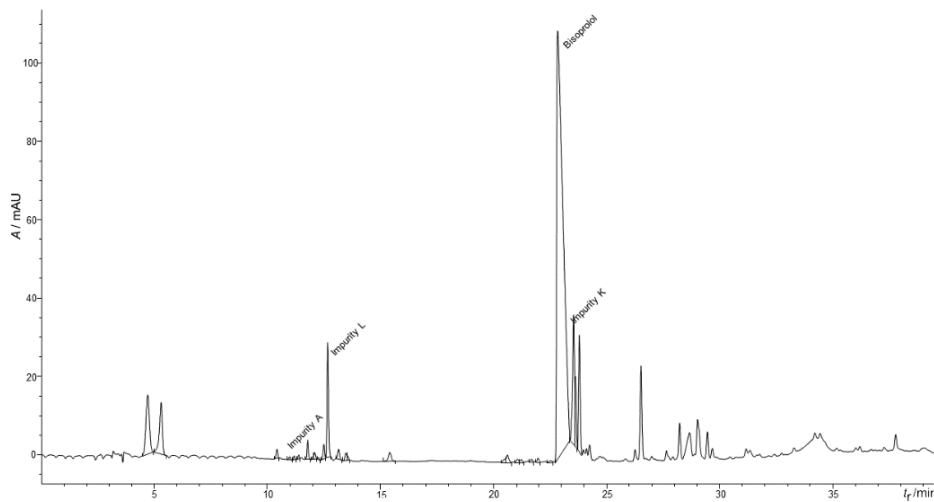


Fig. S-7. Chromatogram of test solution – thermal degradation.

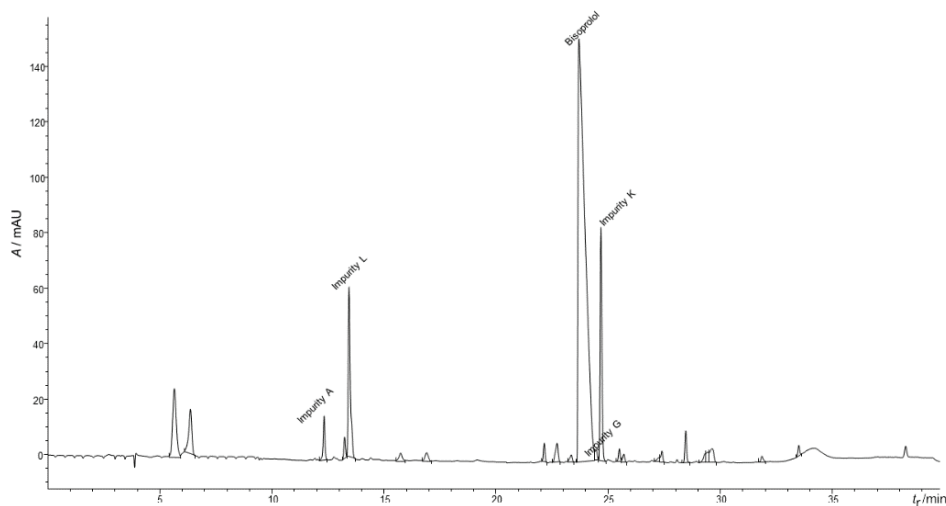
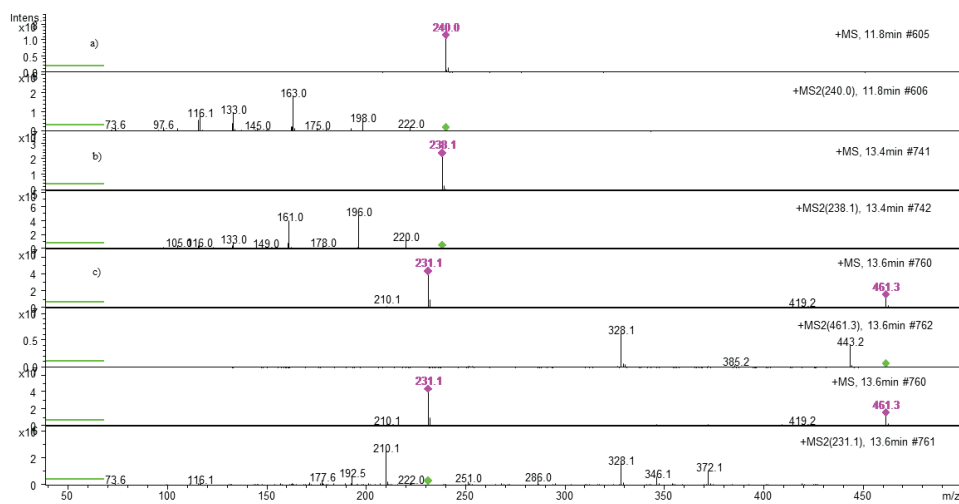


Fig. S-8. Chromatogram of test solution – photodegradation.

Fig. S-9. MS/MS² of a) bisoprolol impurity A, b) bisoprolol impurity L, and c) bisoprolol impurity D detected after acid degradation.

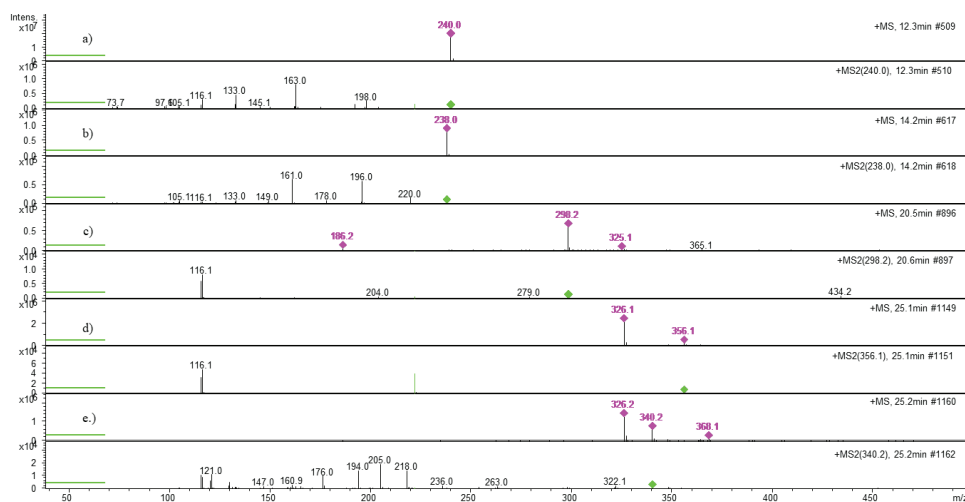


Fig. S-10. MS/MS² of a) bisoprolol impurity A, b) bisoprolol impurity L, c) bisoprolol impurity Q, d) bisoprolol impurity G, and e) bisoprolol impurity K detected after alkaline degradation.

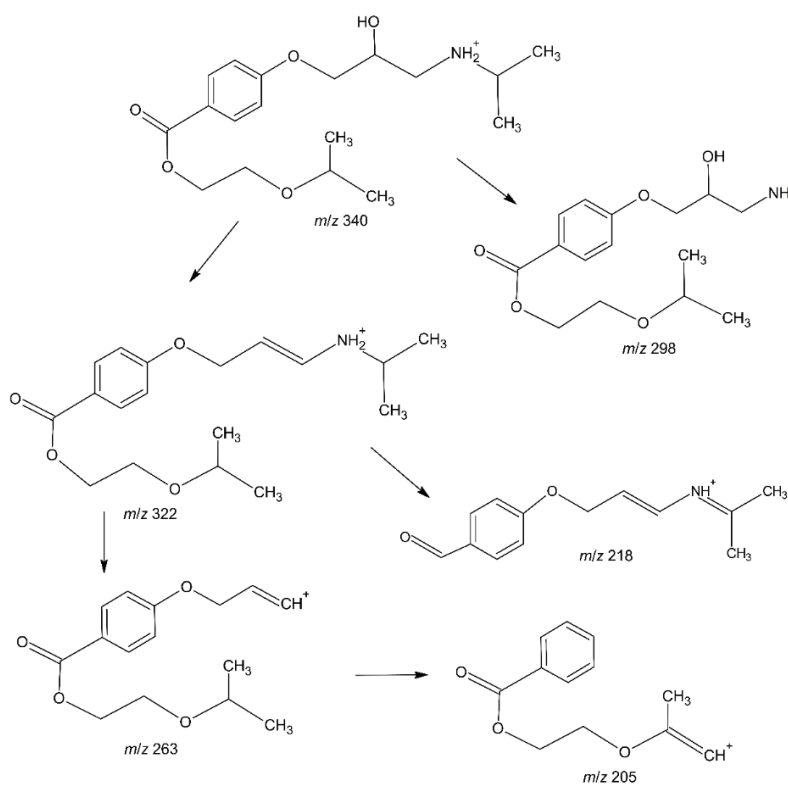


Fig. S-11. Fragmentation pathway of bisoprolol impurity K (C₁₈H₃₀NO₅).

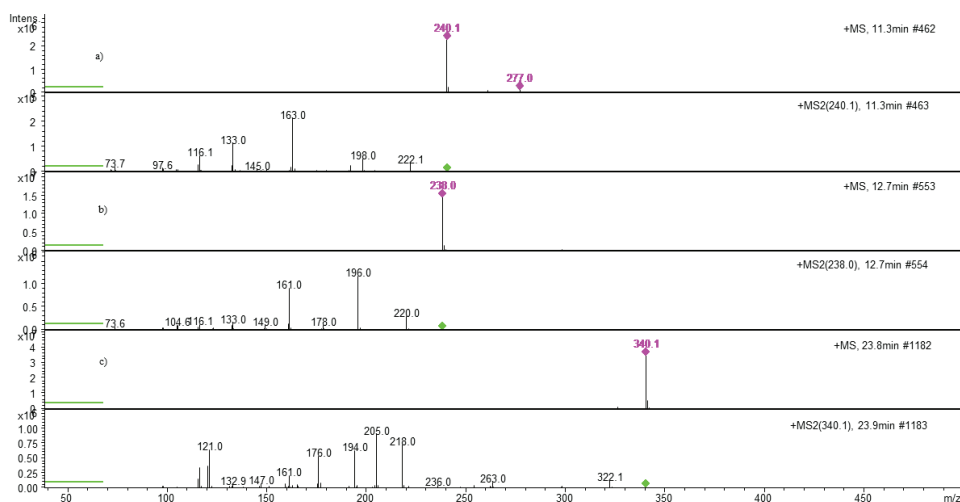


Fig. S-12. MS/MS² of a) bisoprolol impurity A, b) bisoprolol impurity L, c) bisoprolol impurity K detected after oxidative degradation.

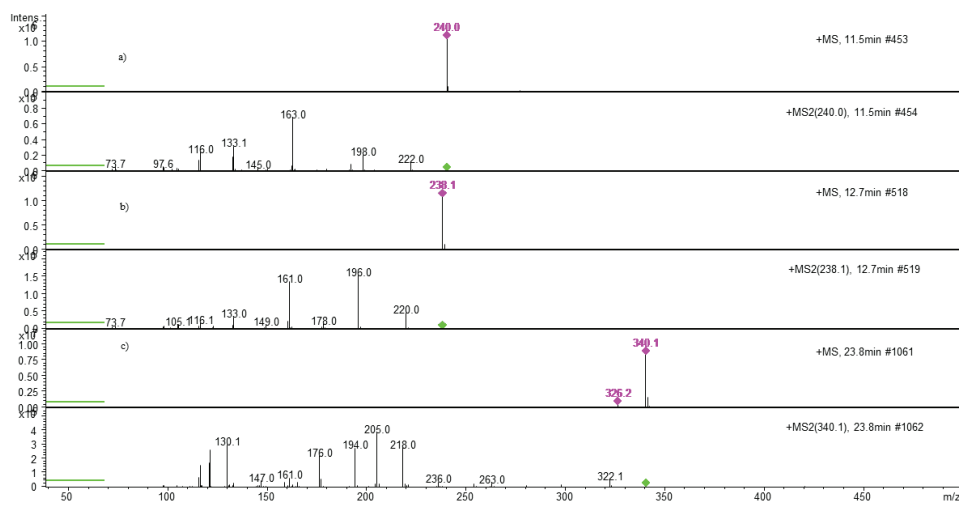


Fig. S-13. MS/MS² of a) bisoprolol impurity A, b) bisoprolol impurity L, c) bisoprolol impurity K detected after thermal degradation.

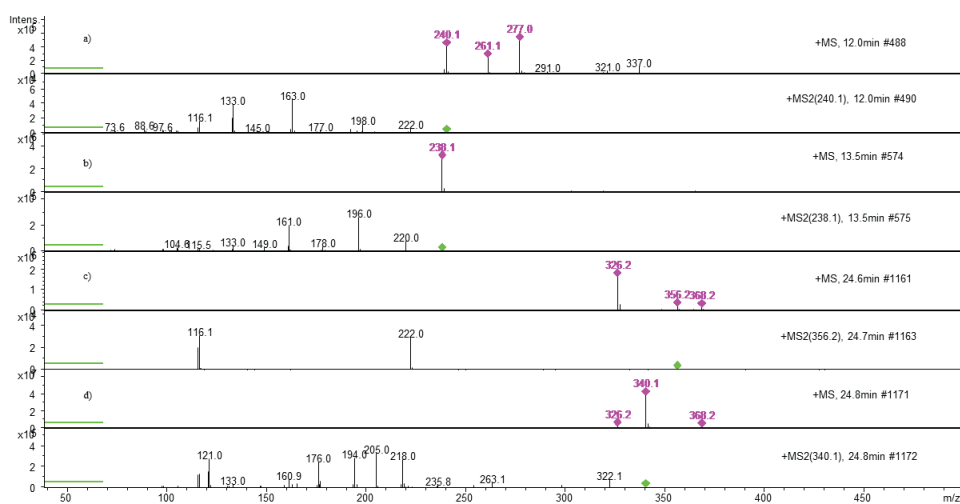


Fig. S-14. MS/MS² of a) bisoprolol impurity A, b) bisoprolol impurity L, c) bisoprolol impurity G, and d) bisoprolol impurity K detected after photodegradation.