

Kinetics of α -glucosidase inhibition by alkaloids and phenolics from

Zanthoxylum chalybeum root bark

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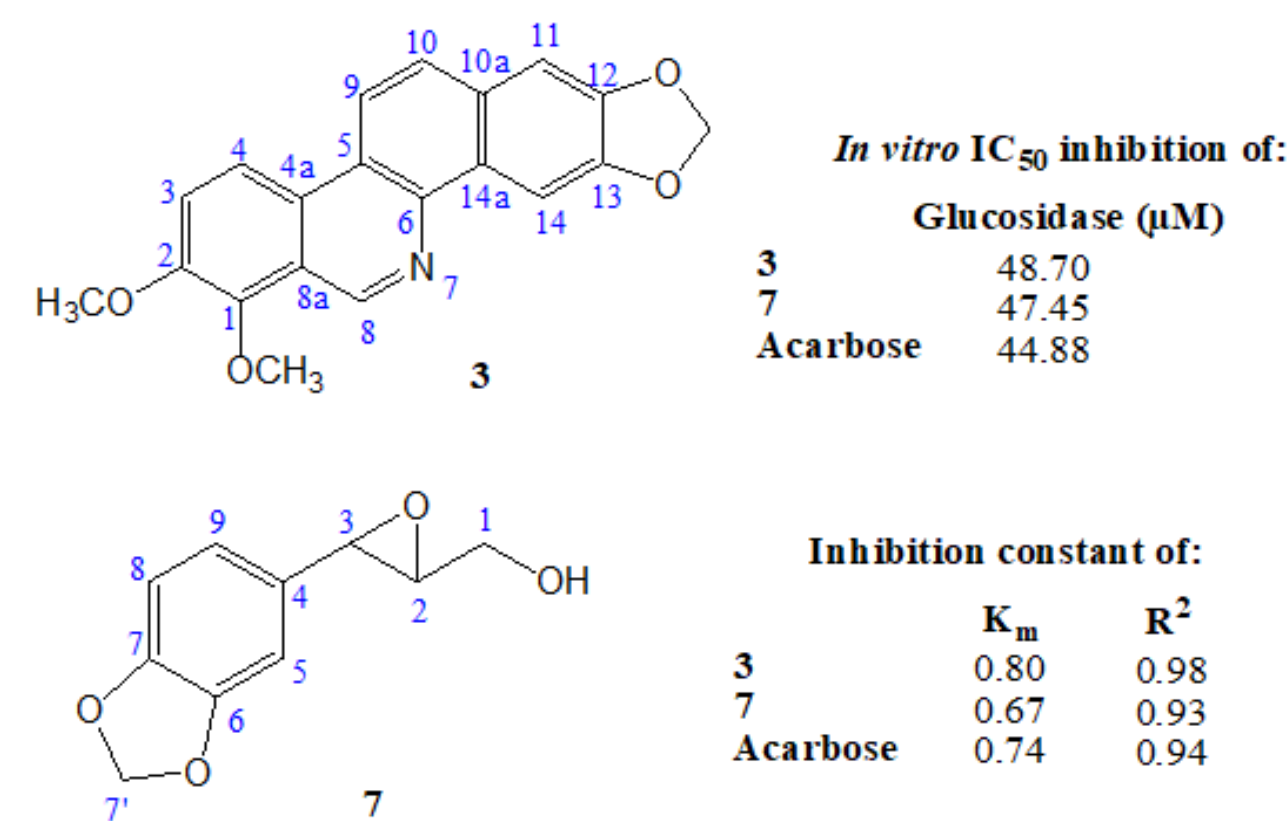
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Graphical Abstract



Zanthoxylum chalybeum Engl



Introduction

Zanthoxylum chalybeum Engl. (family Rutaceae), used in ethno-medicine against diabetic complications [1]. The root and stem bark decoctions of *Z. chalybeum* reported to possess significant antihyperglycemic activities [1, 2]. Metabolites of this plant were established previously; however, the mode of antihyperglycemic inhibition of alkaloids and phenolics had never been established. A systematic chemical analysis of the root bark of *Z. chalybeum* was conducted on alkaloid and the alkaloid free fractions and kinetics of inhibition carried out on isolated alkaloids and phenolics to establish the mode of inhibition.

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Methodology

Z.C crushed root bark 0.8kg
soaked 95% Aq. MeOH
30 g crude extract

Aq. H₂SO₄/EtOAc
total alkaloid
extraction

0.7 g alkaloid
extract

α -Glucosidase
inhibition assay

11 g alkaloid
free extract

Chromatography
RP-C18(CC)
PTLC
8 compounds

Spectroscopy

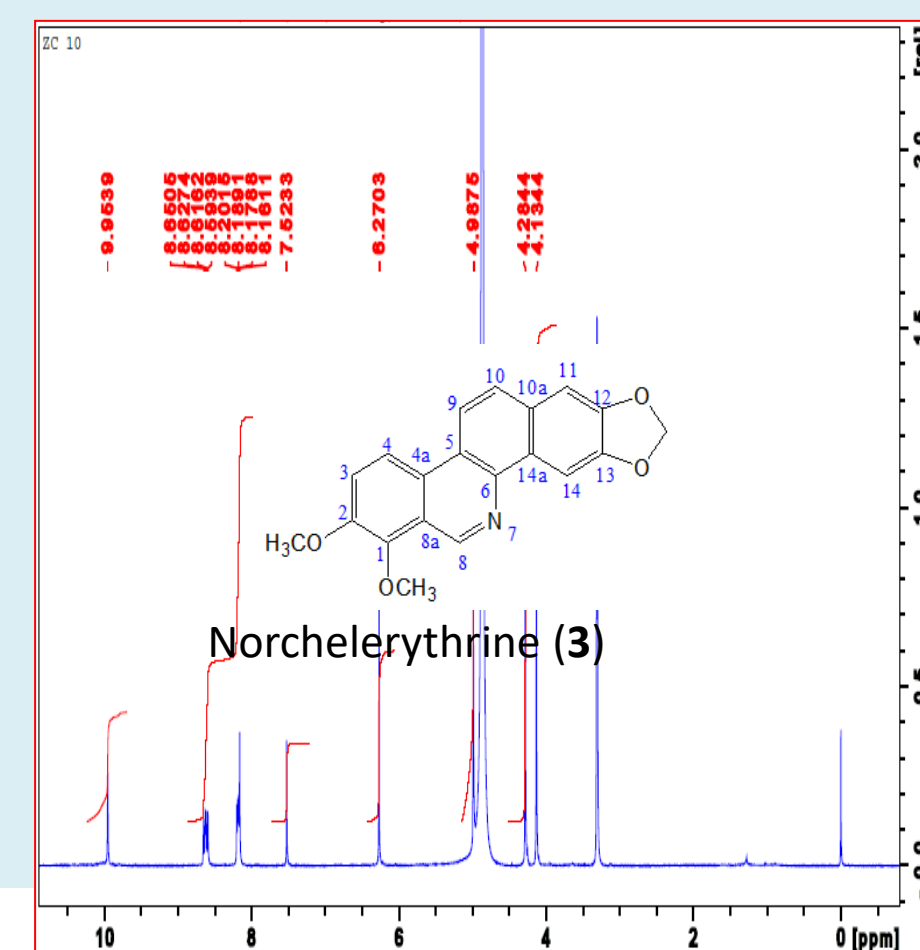


Figure 1: ¹H NMR 1

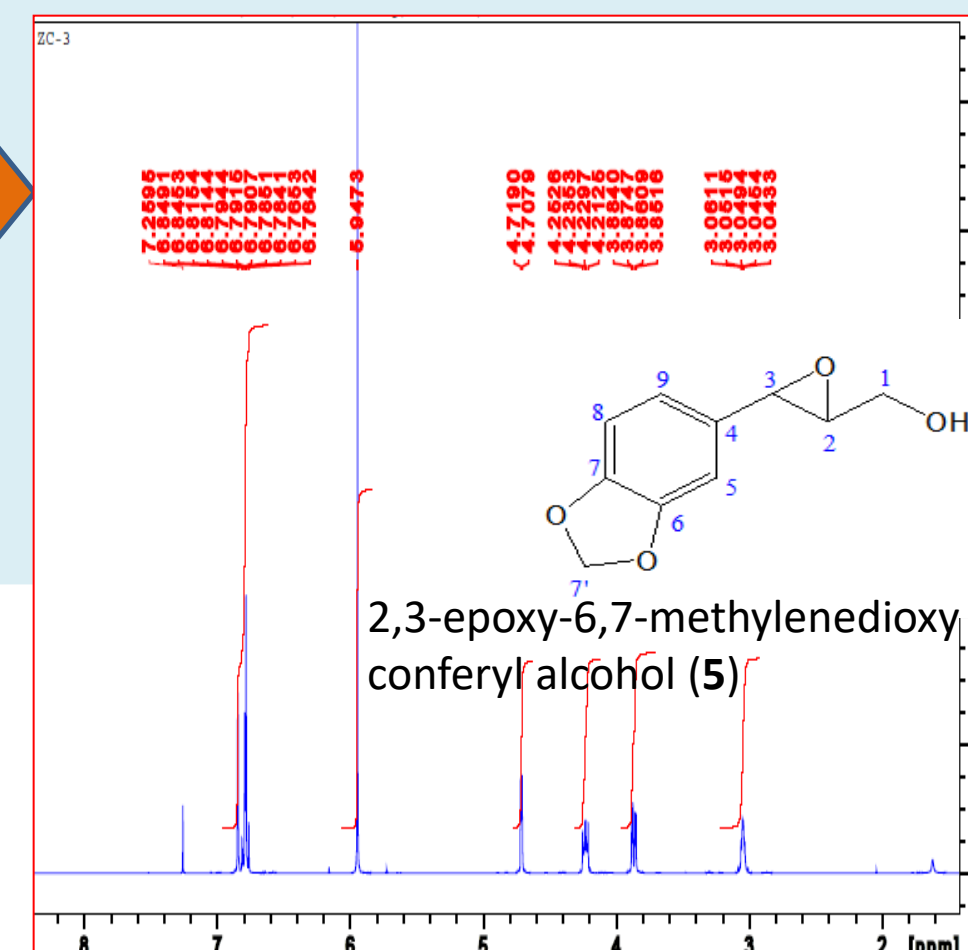


Figure 2: ¹H NMR 2

Results

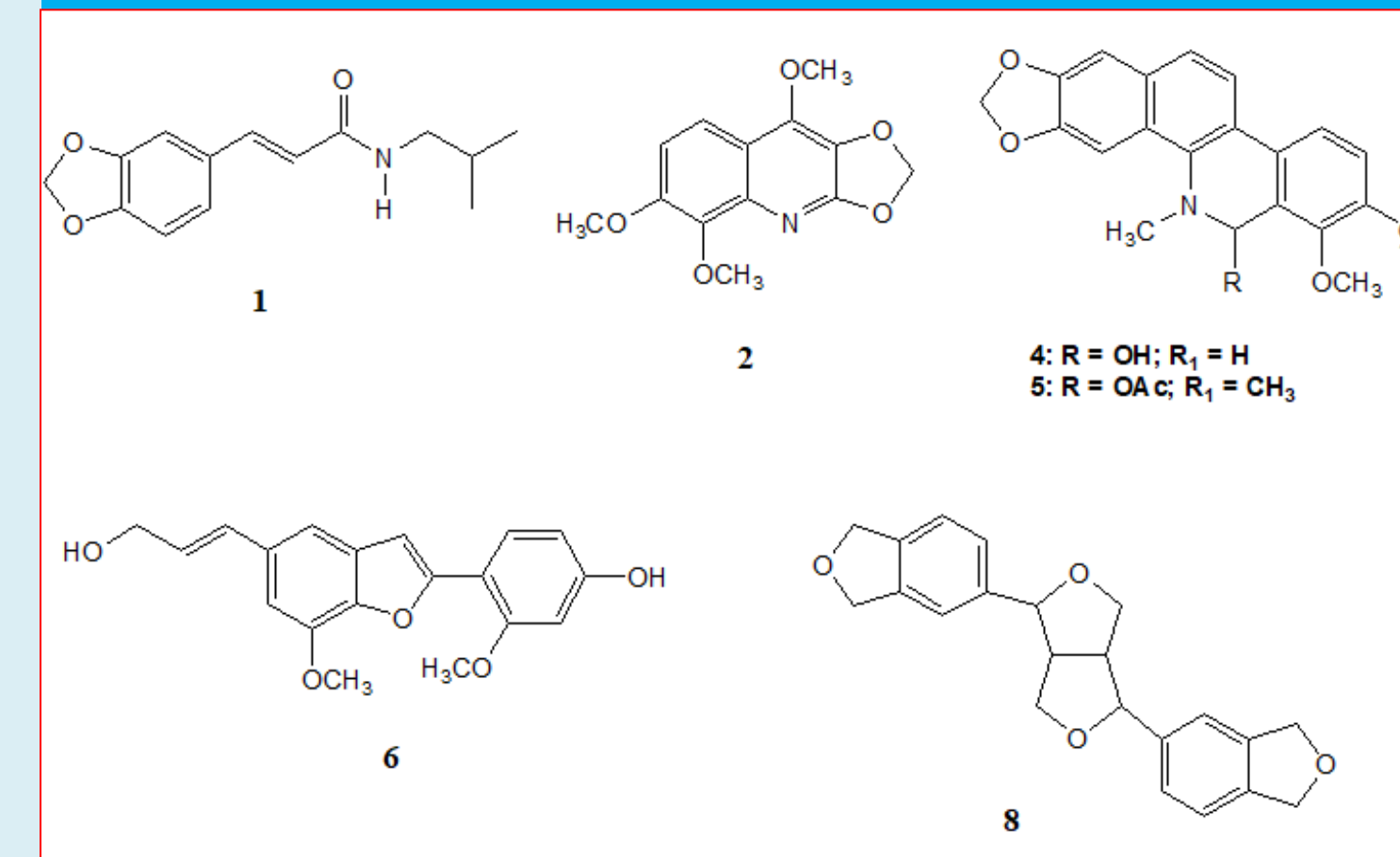


Figure 3: fagaramide (1); skimmianine (2), 6-acetyldihydrochelerythrine (4), 6-hydroxy-N-methyl decarine (5); ailanthoidol (6), sesamine (8)

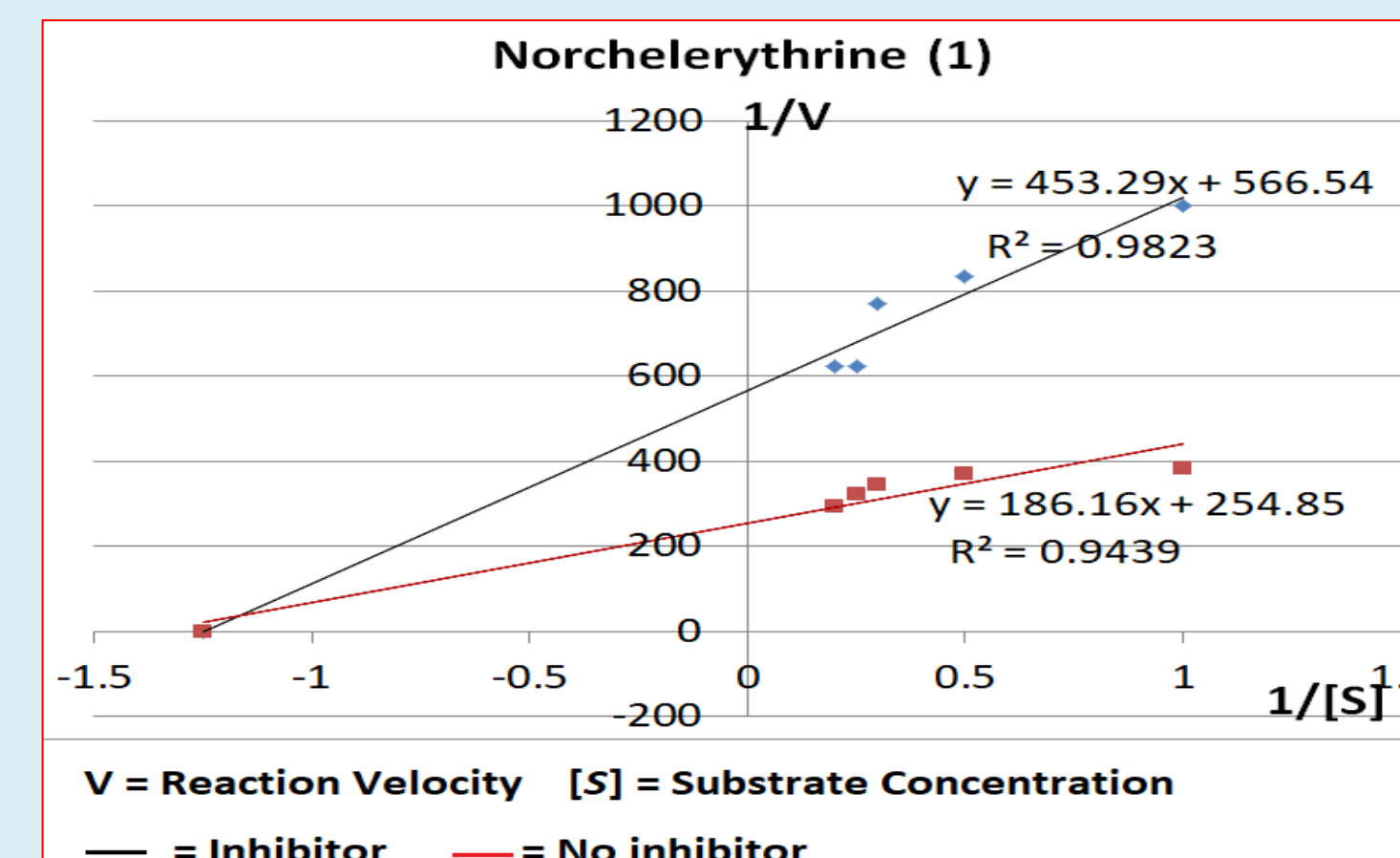


Figure 4: Lineweaver-burk plot for α -glucosidase catalysed hydrolysis in presence and absence of (1)

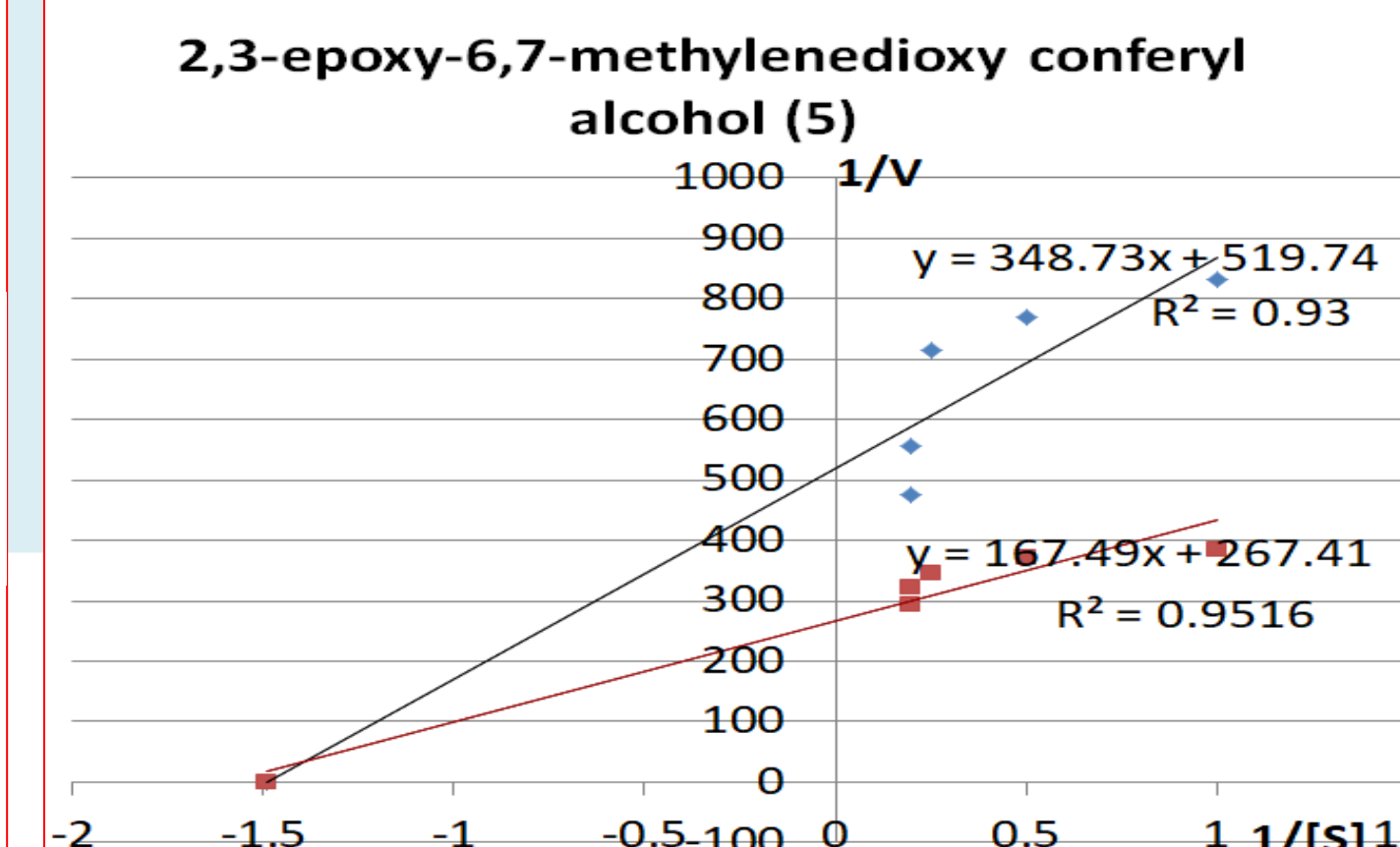


Figure 5: Lineweaver-burk plot for α -glucosidase catalysed hydrolysis in presence and absence of (7)

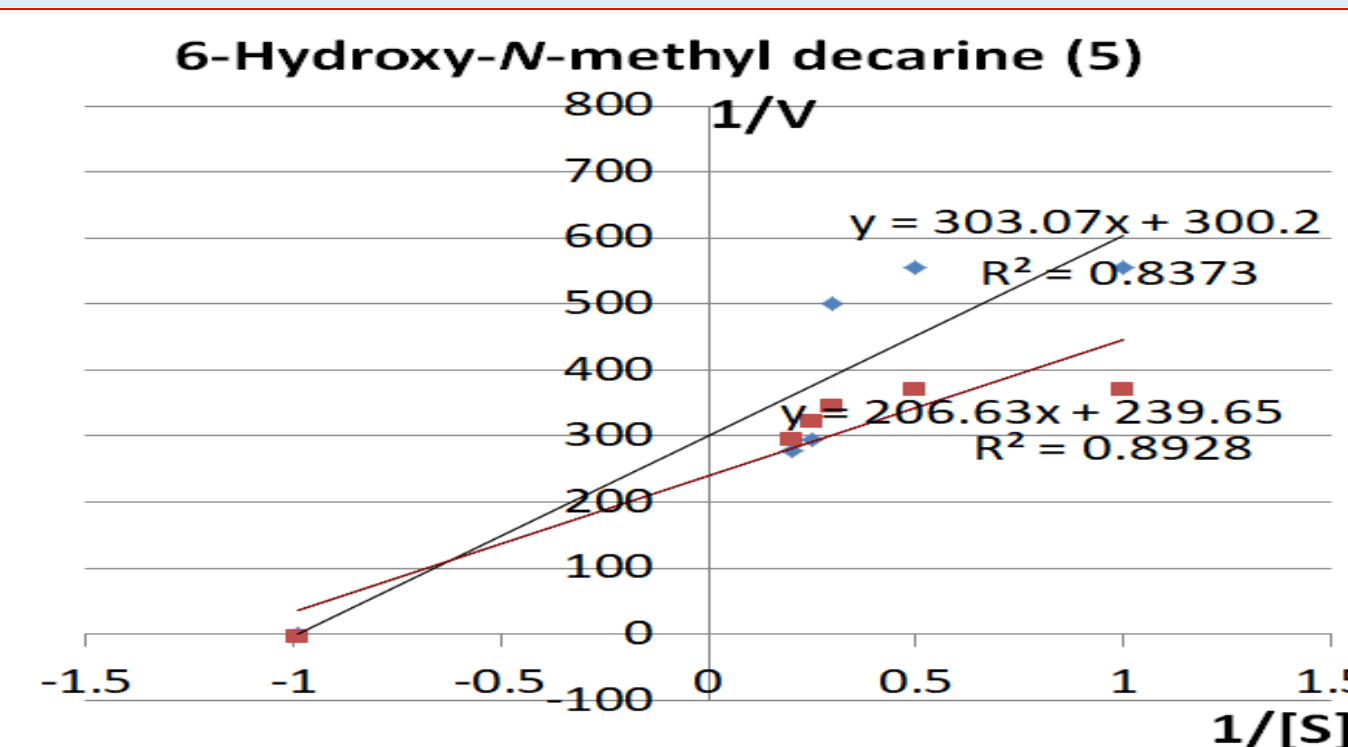


Figure 6: Lineweaver-burk plot for α -glucosidase catalysed hydrolysis in presence and absence of (5)

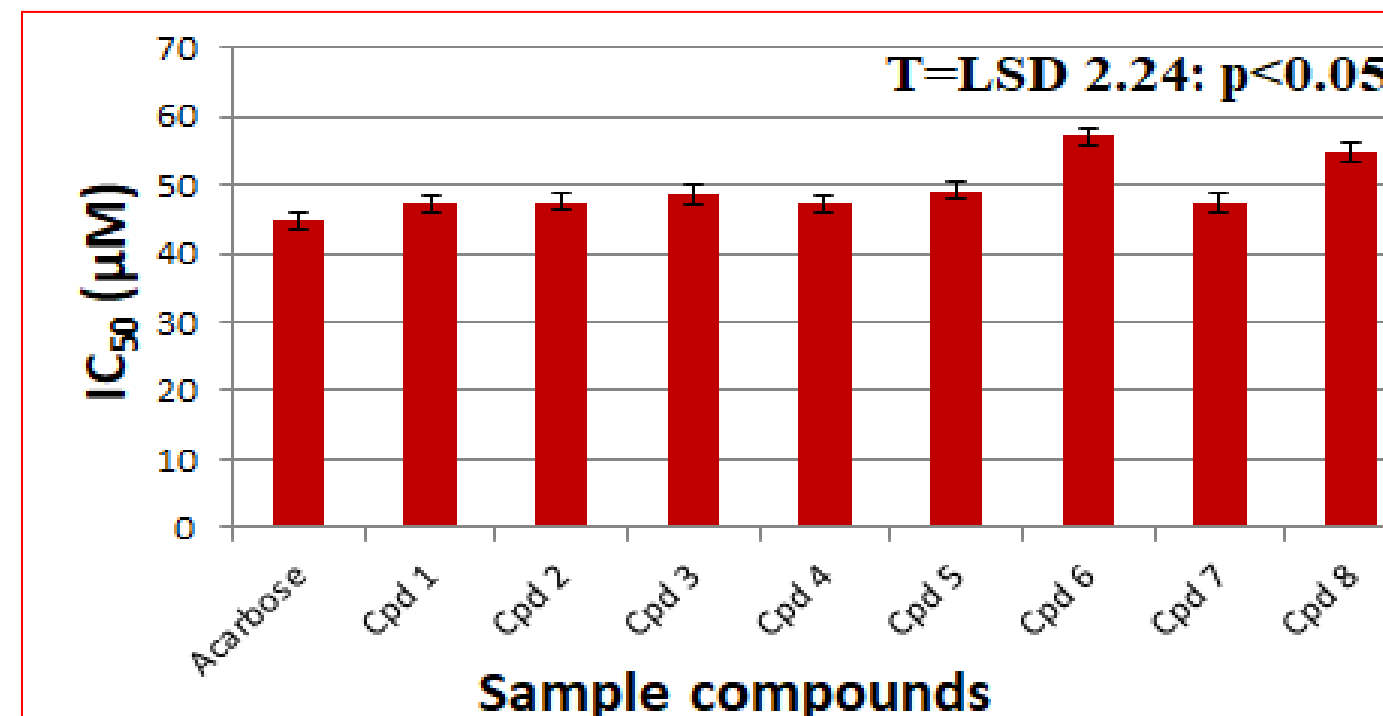


Figure 7: α -Glucosidase IC₅₀ of compounds (mean $\pm$ standard error)

Conclusions

- Compounds (3) and (7) exhibited non-competitive inhibition while 1, 2, 4, 5, 6 and 8 showed mixed inhibition against α -glucosidase.
- The results establish the modes of inhibition of alkaloids and phenolic compounds from *Z. chalybeum*.

Acknowledgement

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References

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- Kimani, C. N., Mbaria J. M., Suleiman, M., Gakuya, D., Kiama, S. G. (2015). *Journal of Phytopharmacology*, 4 (3), 183-189.