Supporting Information Available

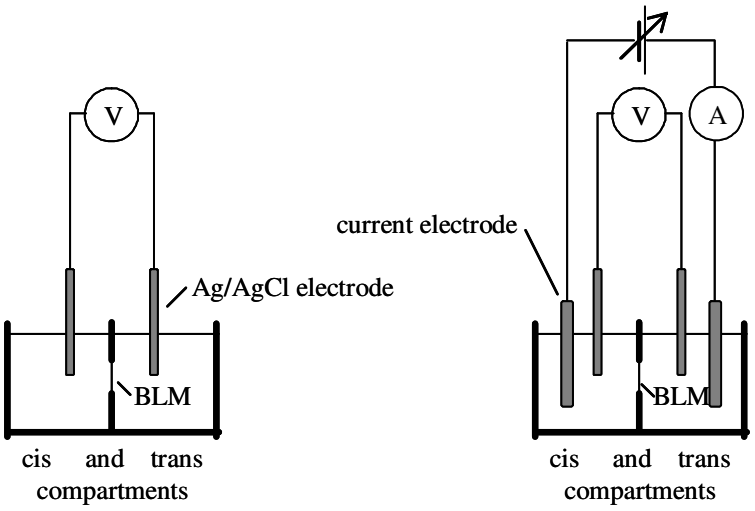

FIG. S1 Measurement setups for bilayer lipid membrane (BLM) experiments. Membrane potential measurements (left side) can be achieved by immersing two reference electrodes (e.g. Ag/AgCl electrodes) on opposite sides of the BLM, connected to a voltmeter. Cyclic voltammetry measurements (right side) involve two additional current electrodes (made from e.g. platinum or stainless steel). The current passed through the current electrodes is controlled by the potential difference at the reference electrodes and simultaneously measured with an ammeter. For both measurement setups the reference electrodes are placed as close as possible to the membrane.

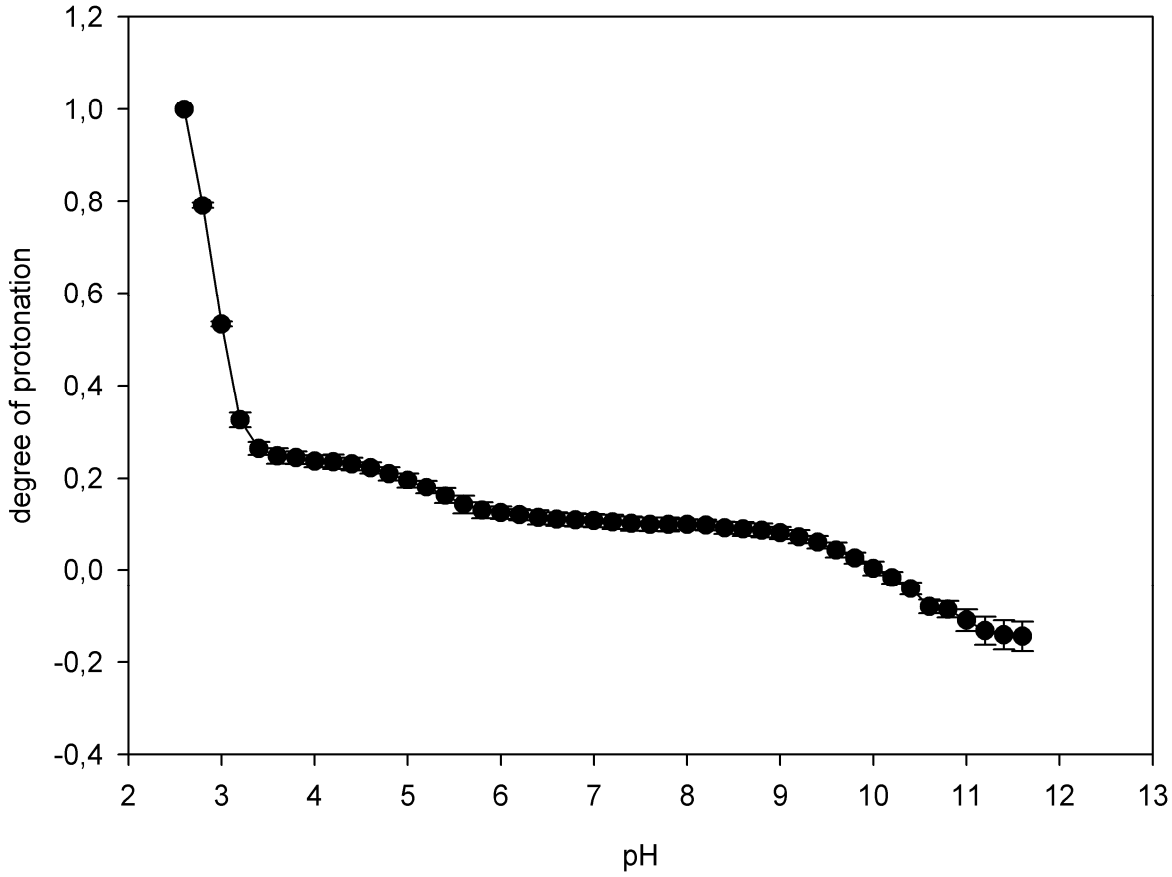

FIG. S2 The degree of protonation P = [HA]/([A-]+[HA]) of isomerized hop compounds (500 µM) related to the pH value, determined by titration according to Wannowius et al. (Wannowius and Plenio 2005).

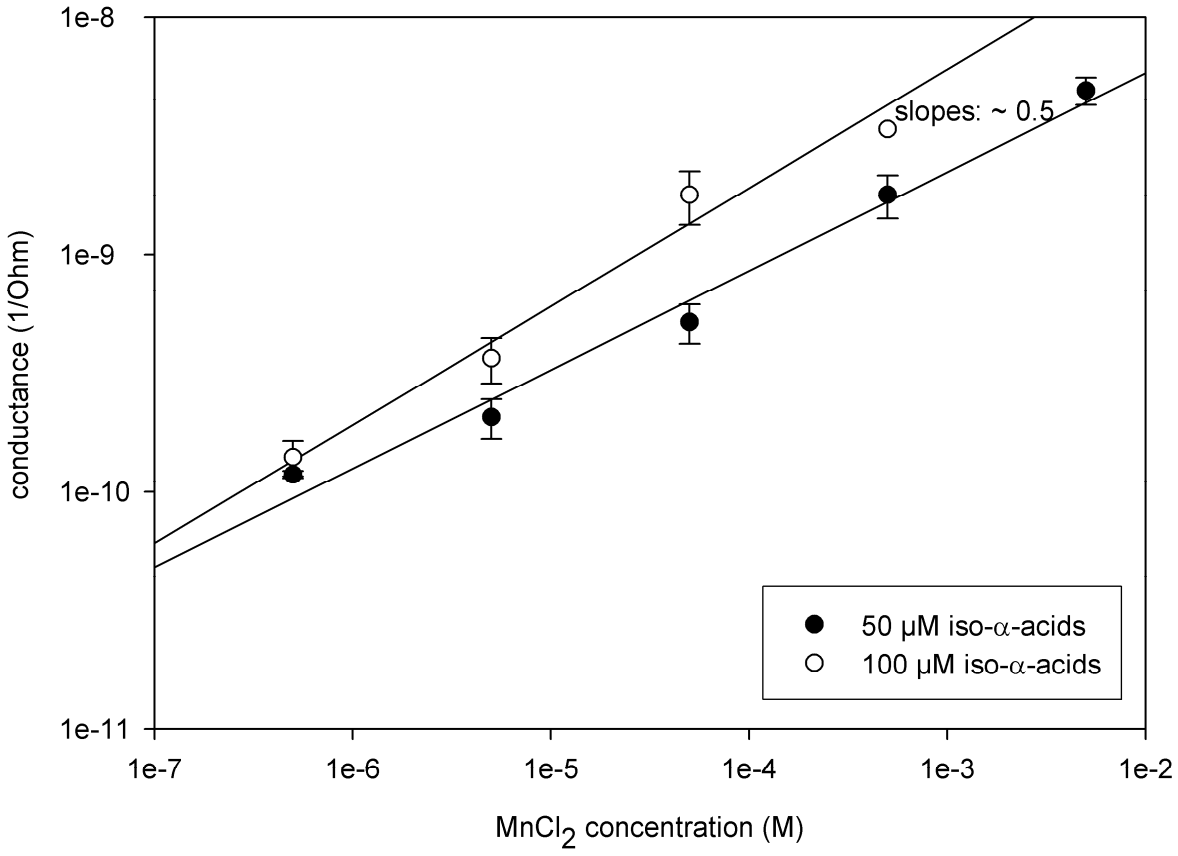

FIG. S3 Dependence of the membrane (*L. brevis* lipid) conductance at 50 mV mediated by iso-α-acids and $MnCl_2$ added to both compartments of the electrolytic cell. The slope (change in log(conductance) per log($MnCl_2$ concentration) is indicated. Composition of aqueous solutions: Tris, Mes, KCl (pH 7.0).

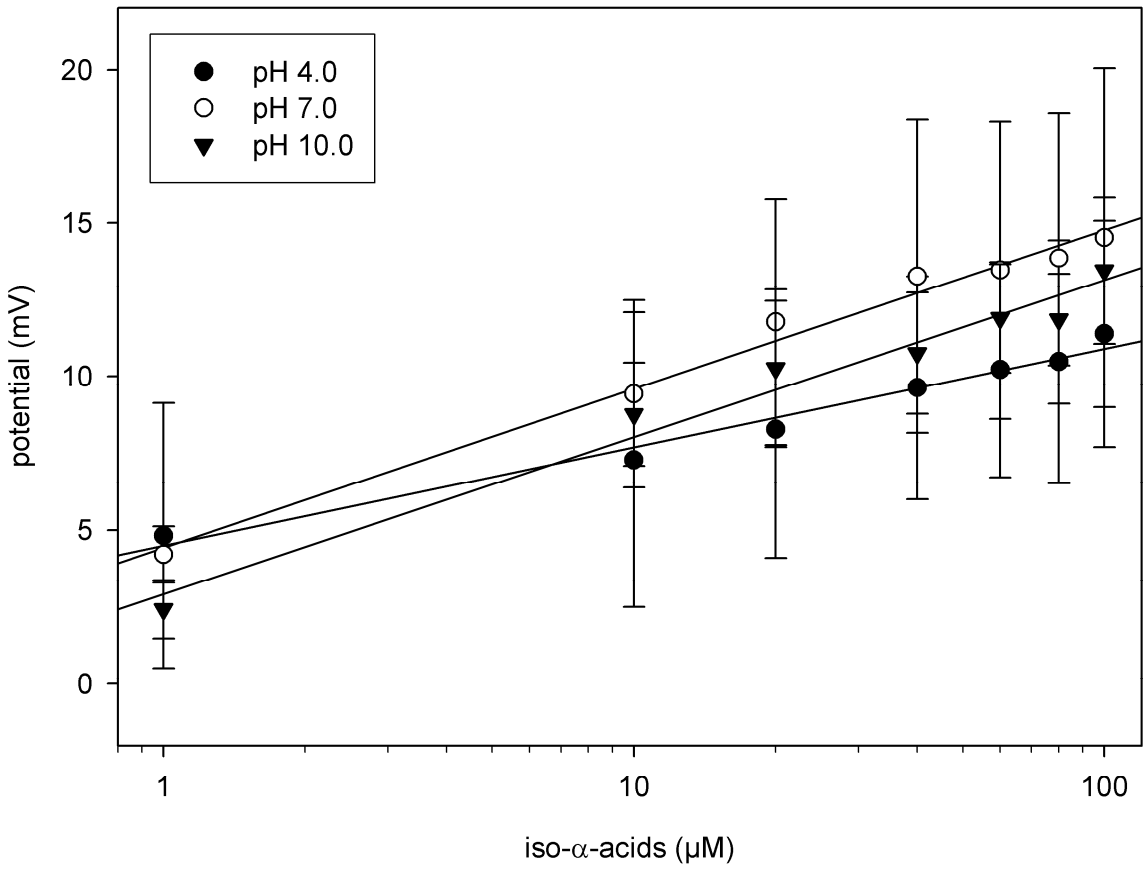

FIG. S4 Potential generation on BLM (PC) upon addition of iso-α-acids in one compartment of the electrolytic cell at pH 4.0, 7.0 and 10.0. The potential is positive on the side of iso-α-acids addition. Composition of aqueous solutions: Tris, Mes, citrate, KCl at pH indicated.

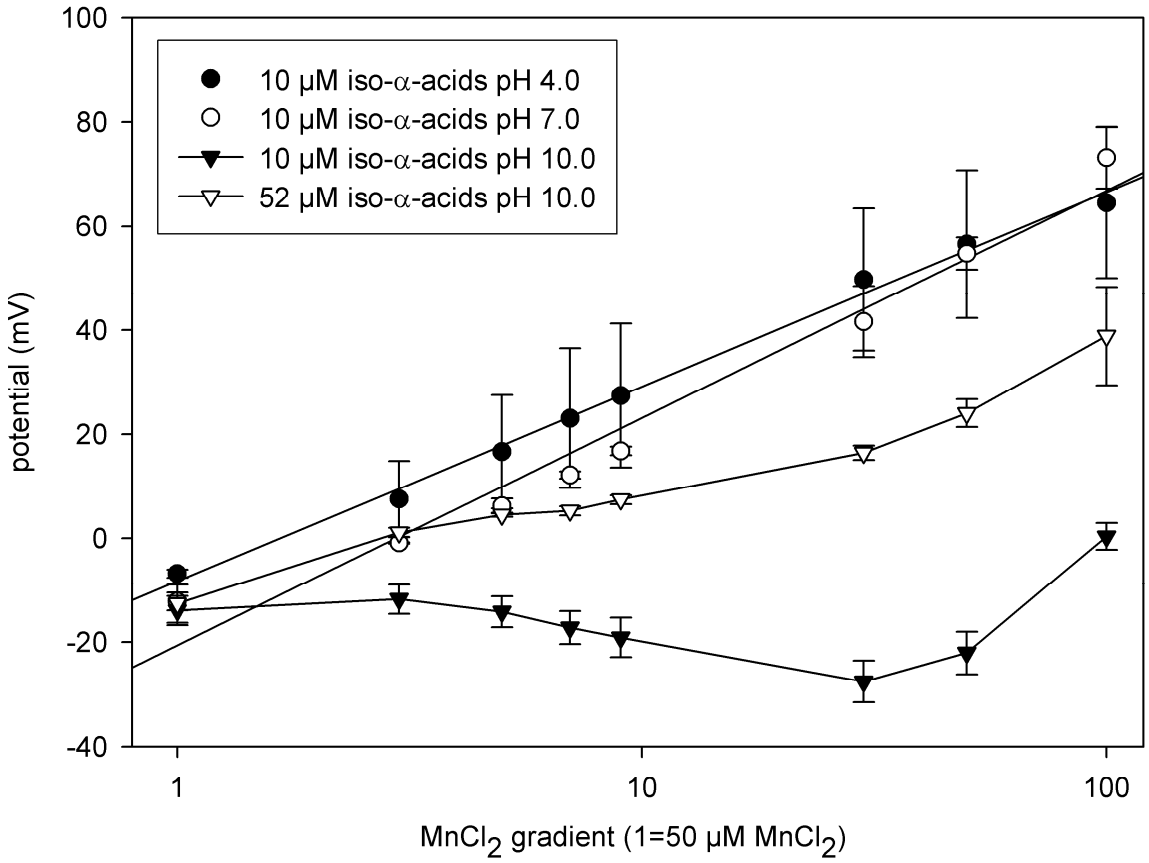

FIG. S5 Potential generation on BLM (PC) upon addition of $MnCl_2$ in one compartment of the electrolytic cell in the presence of iso-α-acids in both compartments of the cell at pH 4.0, 7.0 and 10.0. The potential is positive on the side of $MnCl_2$ addition. Composition of aqueous solutions: Tris, Mes, citrate, KCl at the pH indicated.