Spectroscopic Analyses and Antimicrobial Activity of Novel Ciprofloxacin and 7-Hydroxy-4-methylcoumarin, the Plant-Based Natural Benzopyrone Derivative

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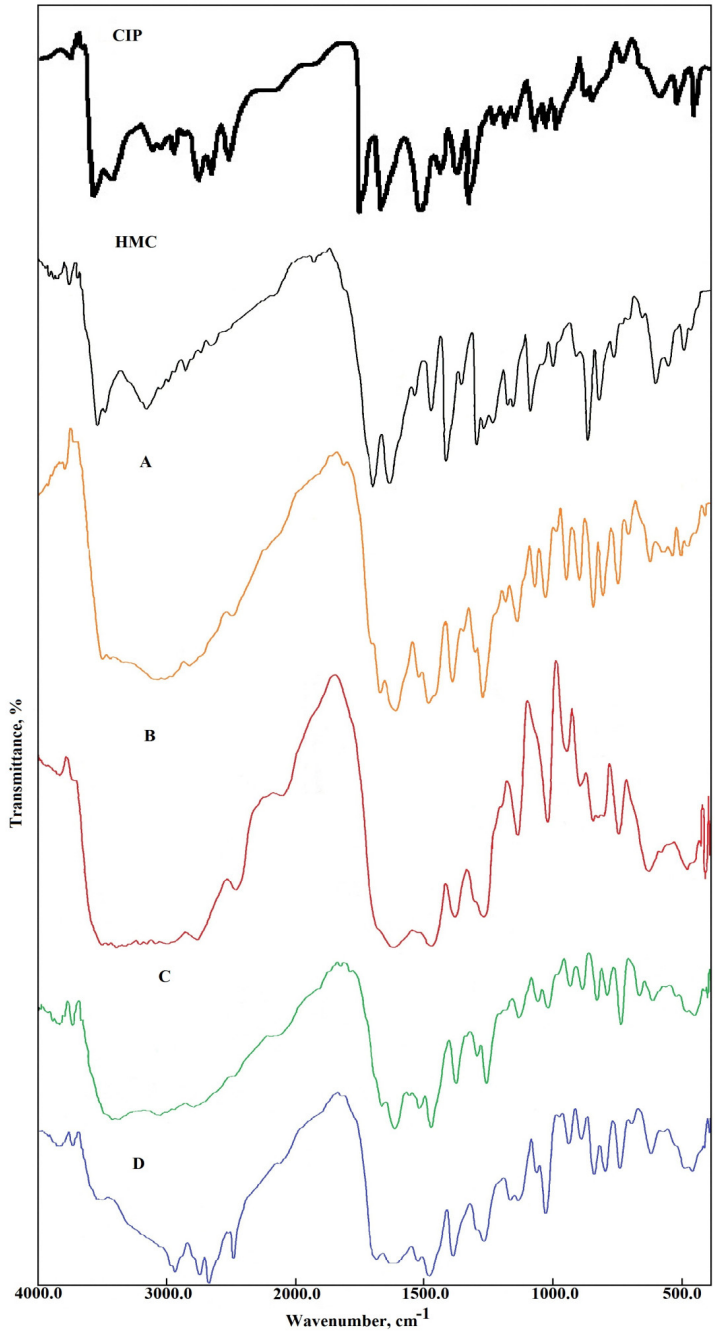


Figure S1. Infrared spectra for CIP, HMC and their Zr(IV) complexes (**A)** [ZrO(CIP)(HMC)(H_2O)Cl]Cl.5H_2O, **(B)** [ZrO(CIP)(HMC)(DMF)(H_2O)]Cl_2.10H_2O, **(C)** [ZrO(CIP)(HMC)(Py)(H_2O)]Cl_2.10H_2O and **(D)** [ZrO(CIP)(HMC)(Et_3N)(H_2O)]Cl_2.3H_2O.

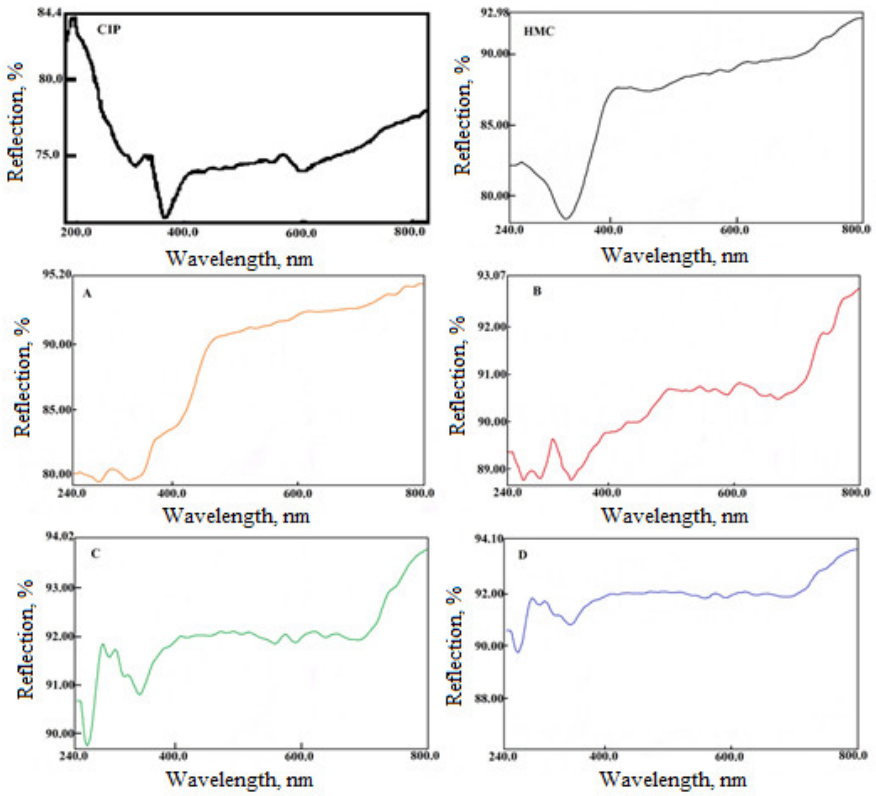


Figure S2. UV-Vis spectra for CIP, HMC and their Zr(IV) complexes (**A)** [ZrO(CIP)(HMC)(H_2O)Cl]Cl.5H_2O, **(B)** [ZrO(CIP)(HMC)(DMF)(H_2O)]Cl_2.10H_2O, **(C)** [ZrO(CIP)(HMC)(Py)(H_2O)]Cl_2.10H_2O and **(D)** [ZrO(CIP)(HMC)(Et_3N)(H_2O)]Cl_2.3H_2O.

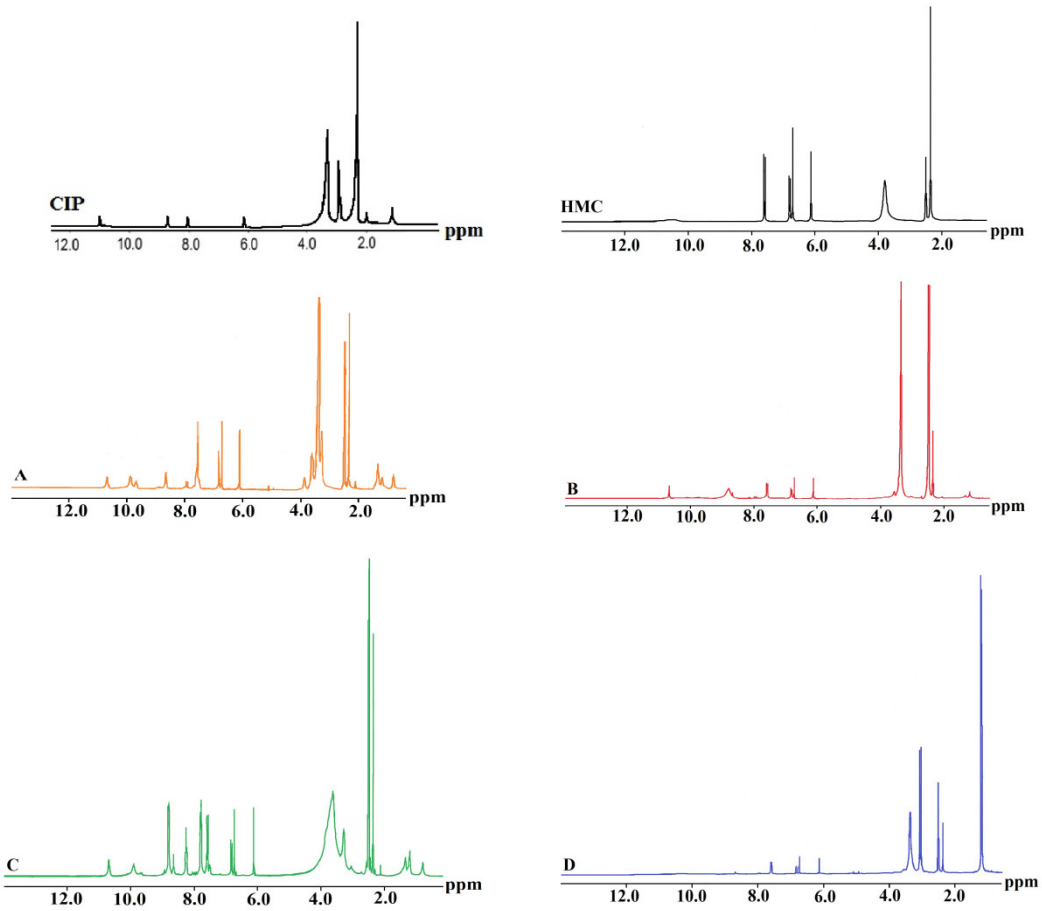


Figure S3. ^{1}H NMR spectra for CIP, HMC and their Zr(IV) complexes (**A)** [ZrO(CIP)(HMC)(H_2O)Cl]Cl.5H_2O, **(B)** [ZrO(CIP)(HMC)(DMF)(H_2O)]Cl_2.10H_2O, **(C)** [ZrO(CIP)(HMC)(Py)(H_2O)]Cl_2.10H_2O and **(D)** [ZrO(CIP)(HMC)(Et_3N)(H_2O)]Cl_2.3H_2O.

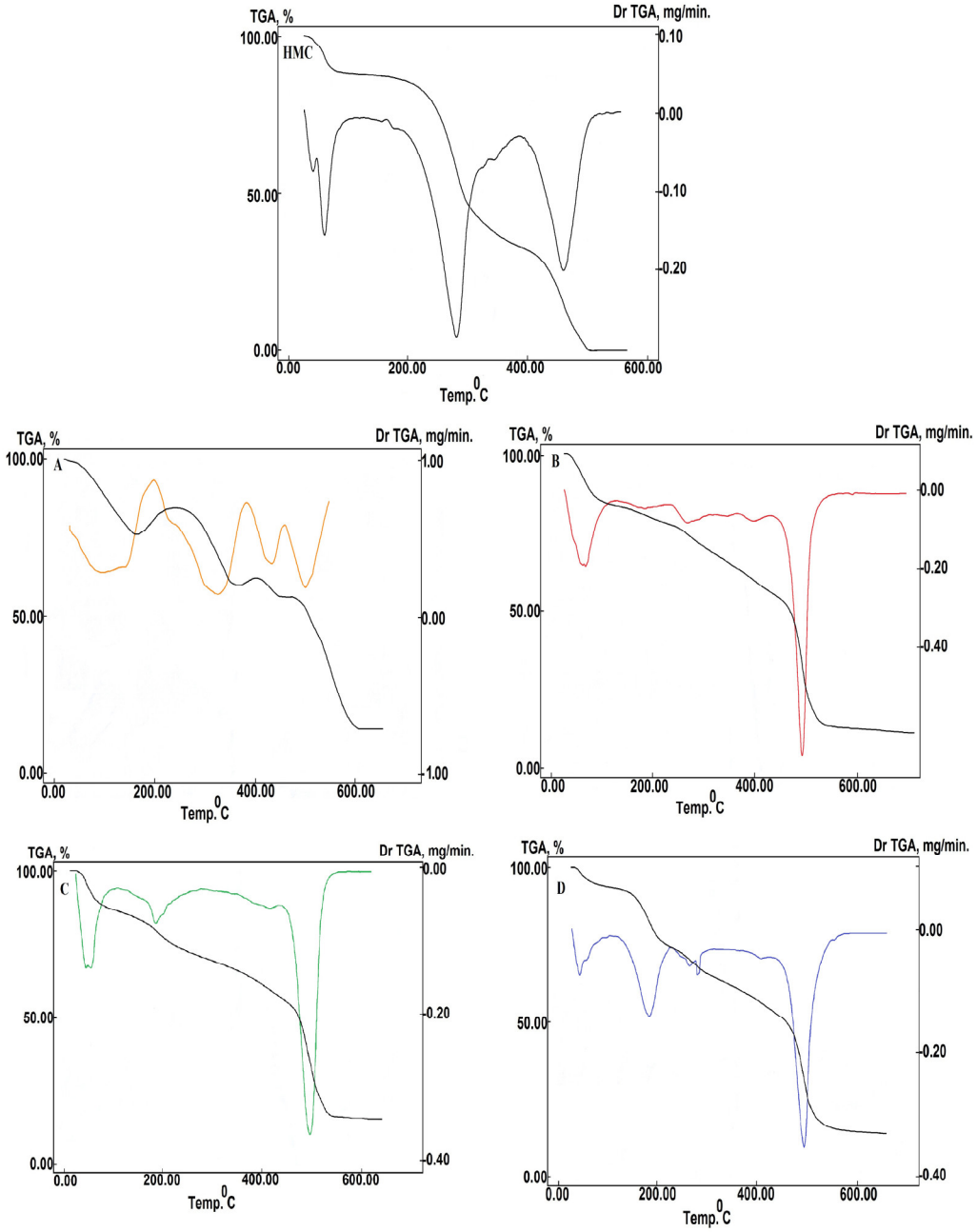
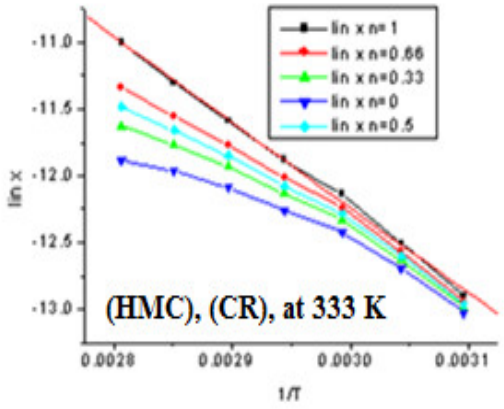


Figure S4. TG and DTG diagrams for CIP, HMC and their Zr(IV) complexes (**A)** [ZrO(CIP)(HMC)(H_2O)Cl]Cl.5H_2O, **(B)** [ZrO(CIP)(HMC)(DMF)(H_2O)]Cl_2.10H_2O, **(C)** [ZrO(CIP)(HMC)(Py)(H_2O)]Cl_2.10H_2O and **(D)** [ZrO(CIP)(HMC)(Et_3N)(H_2O)]Cl_2.3H_2O.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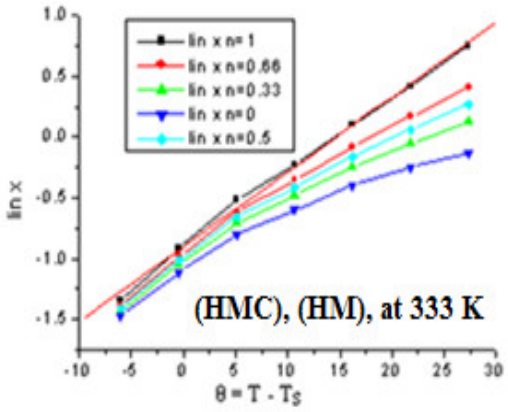
ln x n=0.33
ln x n=0
ln x n=0.5
ln x
1/T
(HMC), (CR), at 333 K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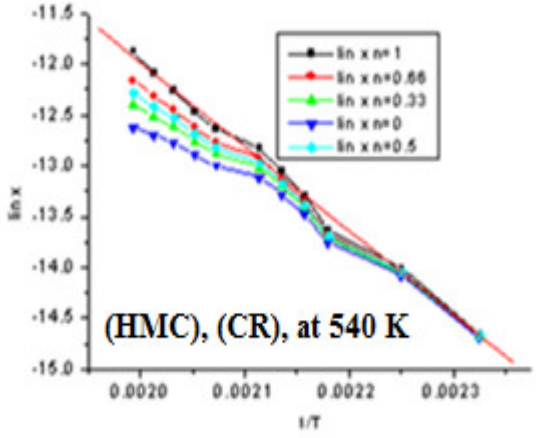
ln x n=0.66
ln x n=0.33
ln x n=0
ln x n=0.5
ln x
θ = T - Ts
(HMC), (HM), at 333 K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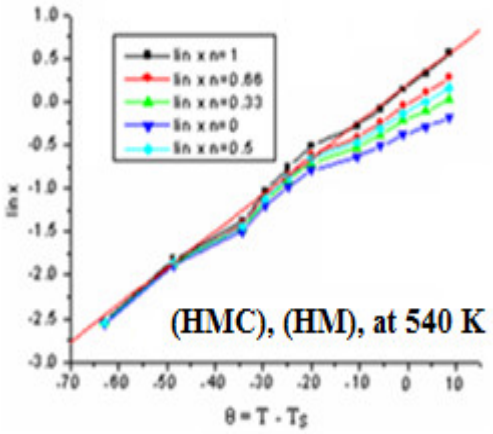
ln x
1/T
(HMC), (CR), at 540 K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ln x n=0.33
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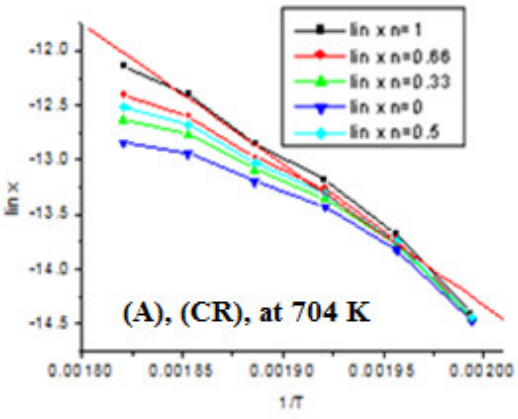
ln x n=0.5
ln x
θ = T - Ts
(HMC), (HM), at 540 K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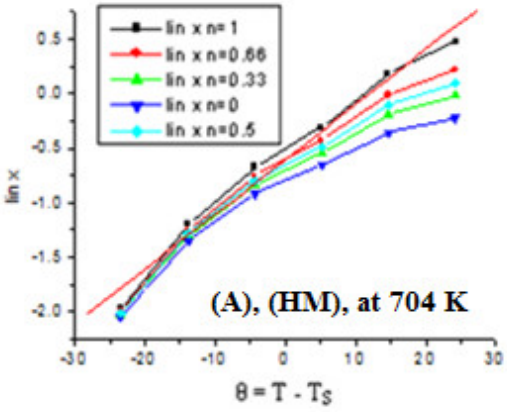
ln x
1/T
(A), (CR), at 704 K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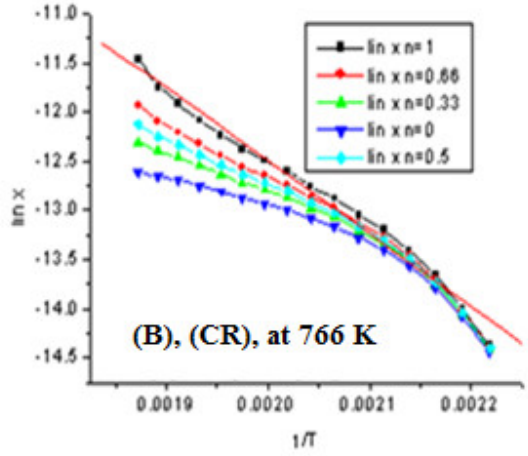
ln x n=0.5
ln x
θ = T - Ts
(A), (HM), at 704 K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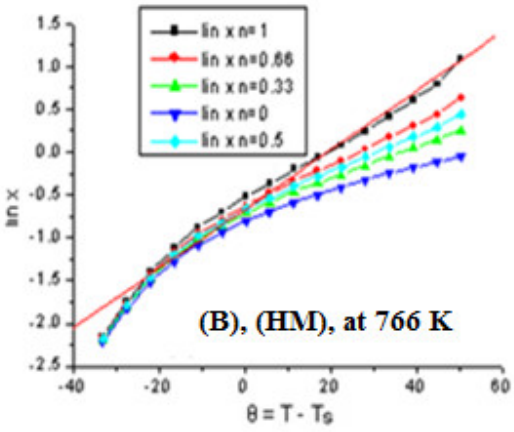
1/T
(B), (CR), at 766 K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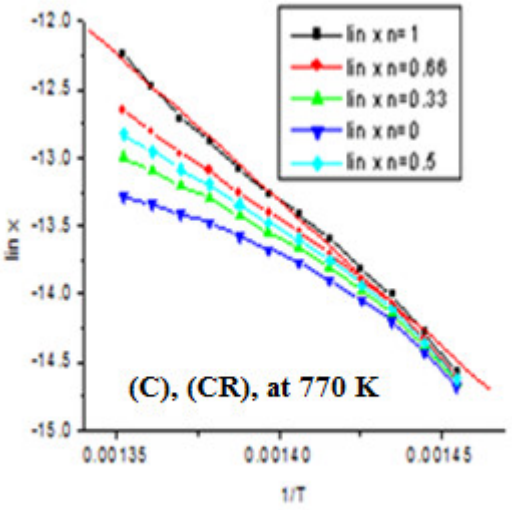
ln x
θ = T - Ts
(B), (HM), at 766 K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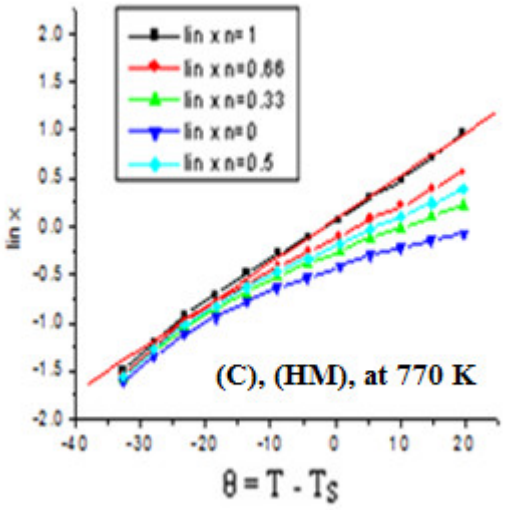
1/T
(C), (CR), at 770 K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ln x n=0.5
ln x
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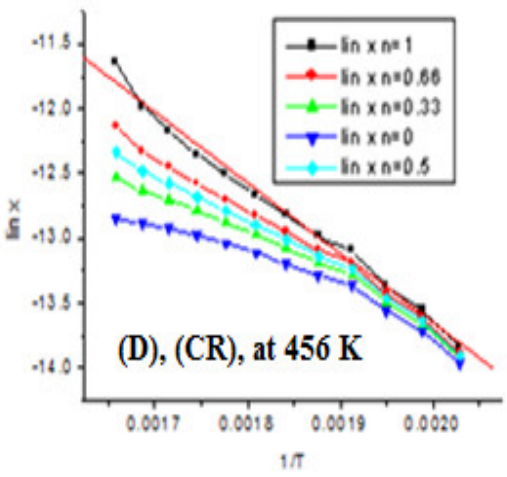
(C), (HM), at 770 K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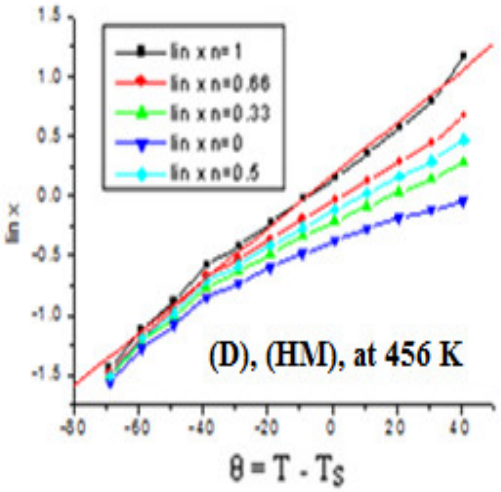
ln x n=0
ln x n=0.5
ln x
1/T
(D), (CR), at 456 K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ln x n=0.66
ln x n=0.33
ln x n=0
ln x n=0.5
ln x
θ = T - Ts
(D), (HM), at 456 K

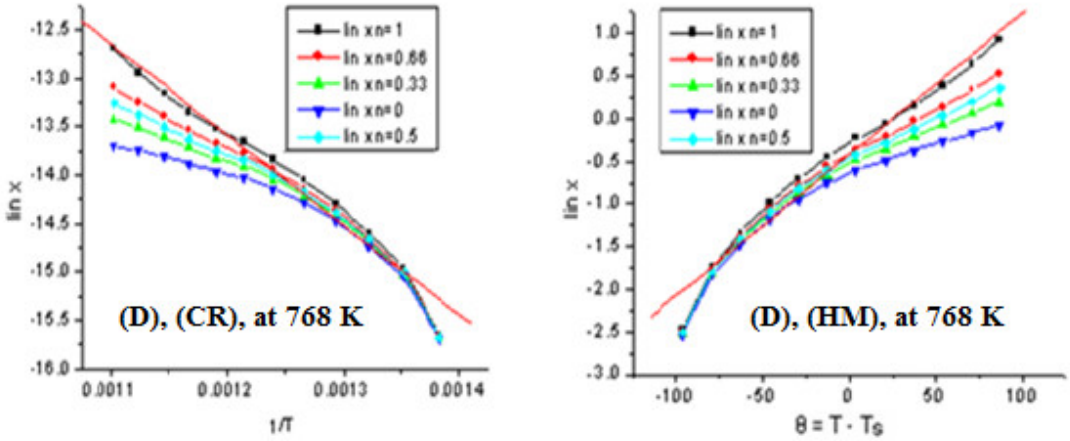

Figure S5. The diagrams of kinetic parameters for CIP, HMC and their Zr(IV) (**A)** [ZrO(CIP)(HMC)(H_2O)Cl]Cl.5H_2O, **(B)** [ZrO(CIP)(HMC)(DMF)(H_2O)]Cl_2.10H_2O, **(C)** [ZrO(CIP)(HMC)(Py)(H_2O)]Cl_2.10H_2O and **(D)** [ZrO(CIP)(HMC)(Et_3N)(H_2O)]Cl_2.3H_2O.

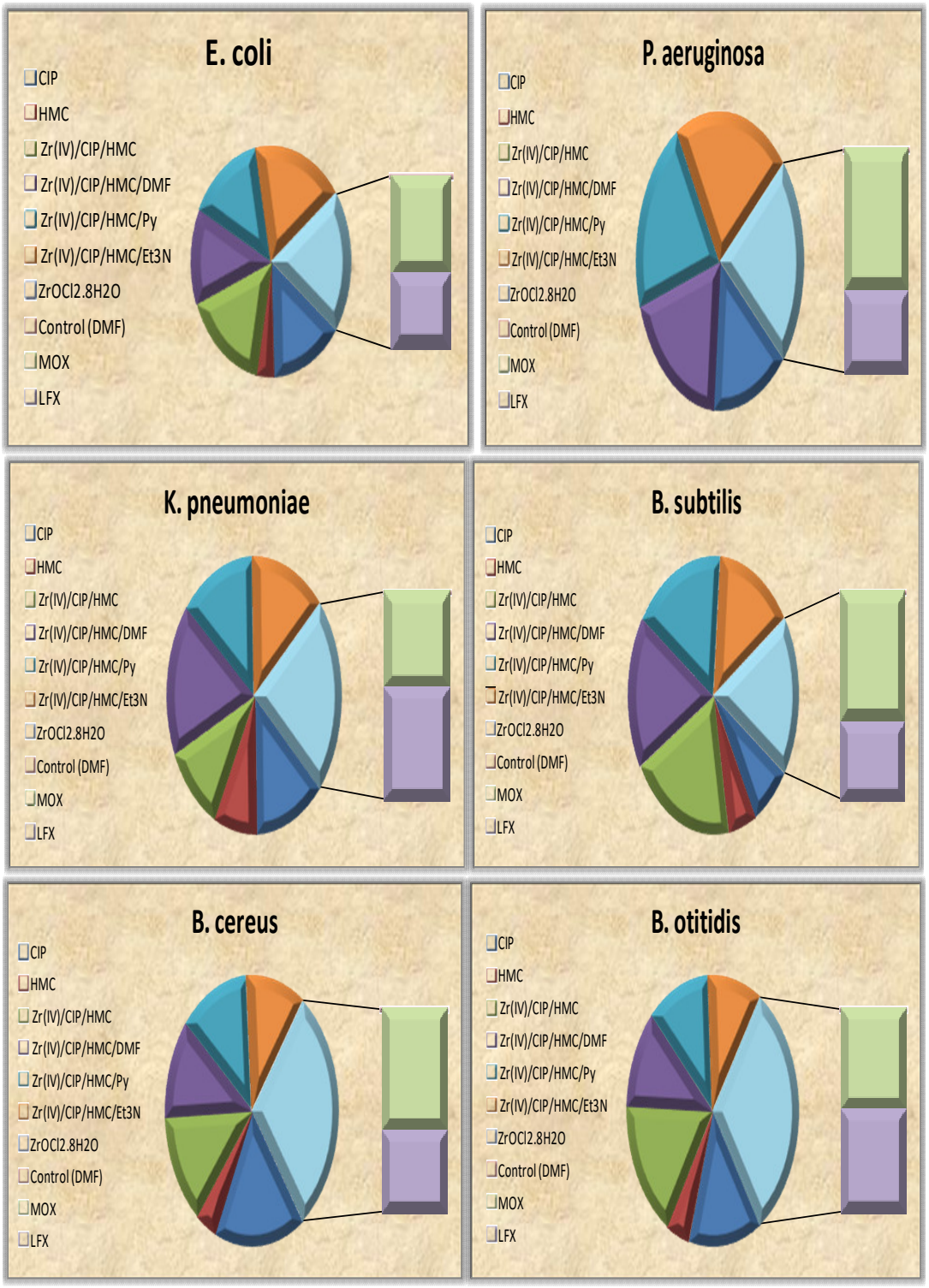

Figure S6. Antimicrobial activity of CIP, HMC and their Zr(IV) complexes.