

Synthesis, Characterization and Application of novel Cationic Surfactants as Antibacterial Agents

Shaban R. M. Sayed ^{1*}, Abdelrahman O. Ezzat ², Mohamed Taha Yassin ¹ and Ashraf M. M. Abdelbacki ³

¹ Department of Botany and Microbiology, College of Science, King Saud University, P.O. Box 2455, Riyadh 11451, Saudi Arabia; myassin2.c@ksu.edu.sa (M.T.Y.)

² Department of Chemistry, College of Science, King Saud University, P.O. Box 2455, Riyadh 11451, Saudi Arabia; aezzat@ksu.edu.sa (A.O.E.)

³ Department of Administrative and Social Sciences, College of Applied Studies and Community Service, King Saud University, P.O. Box 22459, Riyadh 11495, Saudi Arabia; aabdelbacki@ksu.edu.sa (A.M.M.A)

* Correspondence: shmohamed@ksu.edu.sa (S.R.M.S.)

Citation: Shaban R. M. Sayed; Ezzat A.O.; Yassin, M.T.; Ashraf M. M. Abdelbacki Synthesis and Characterization of New Cationic Surfactants Based on Quaternary Hexamethylenetetramine as Antibacterial Agents. *Separations* **2022**, *9*, x. <https://doi.org/10.3390/xxxxx>

Academic Editor(s):

Received: date

Accepted: date

Published: date

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2022 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

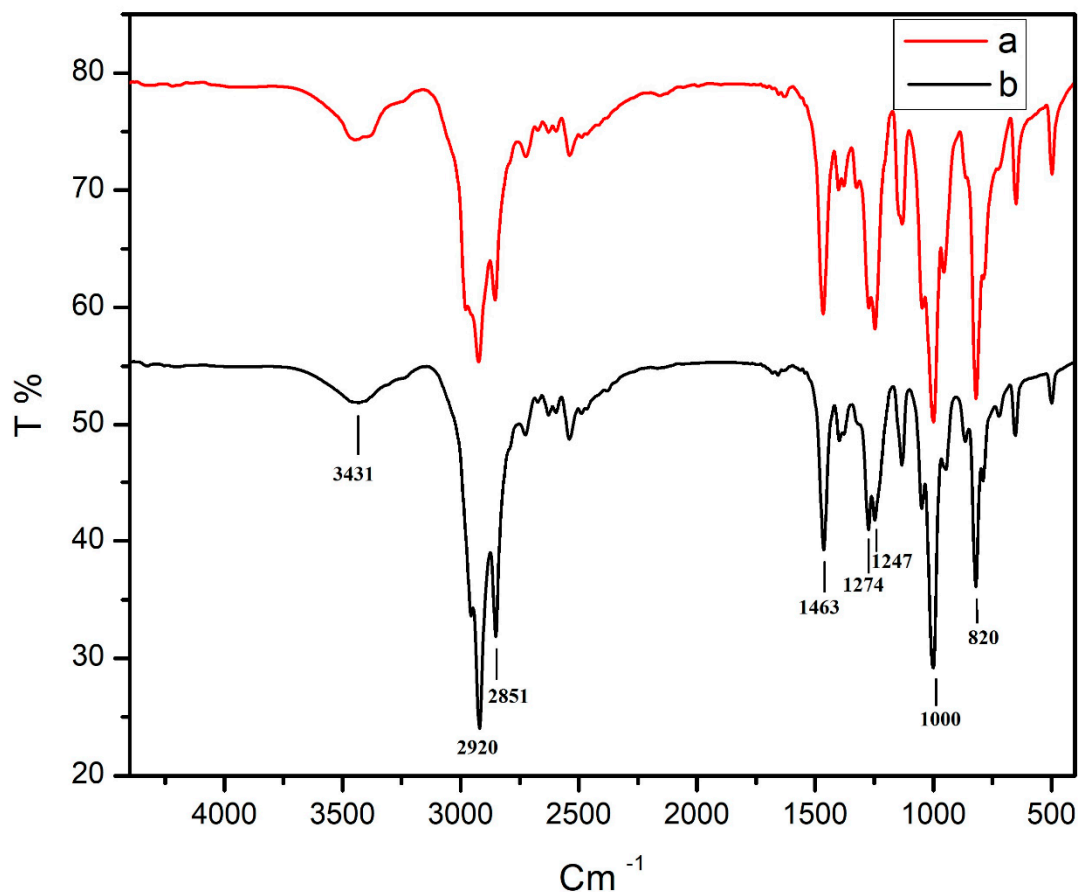


Figure S1. FTIR spectra of a) QHETA-9 and b) QHETA-14.

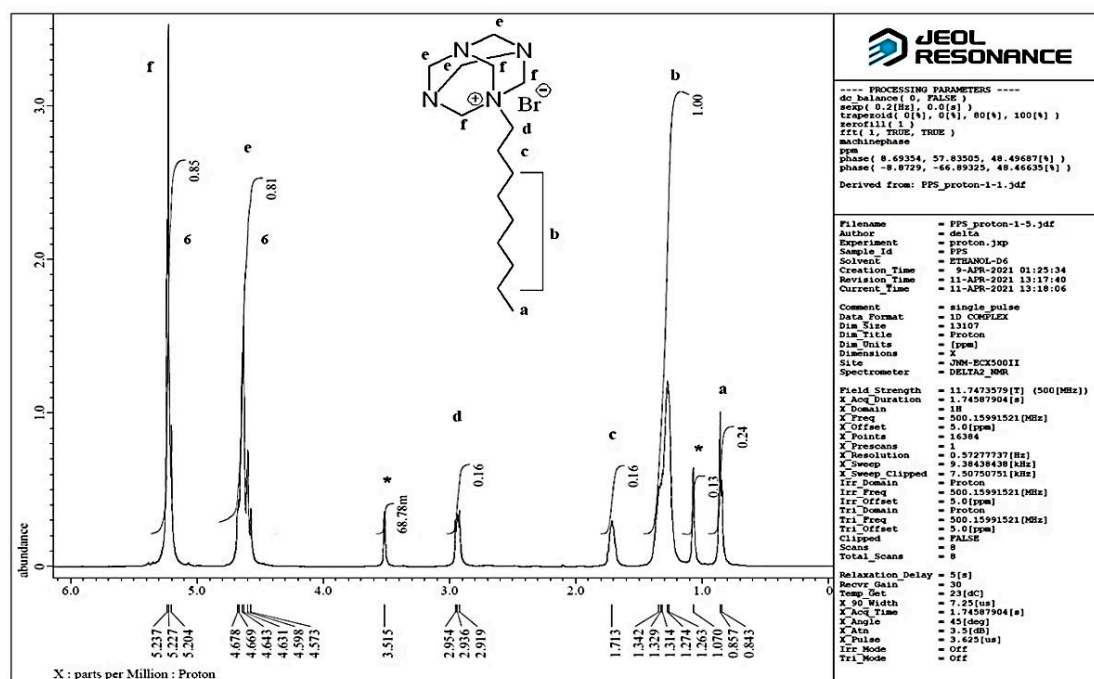
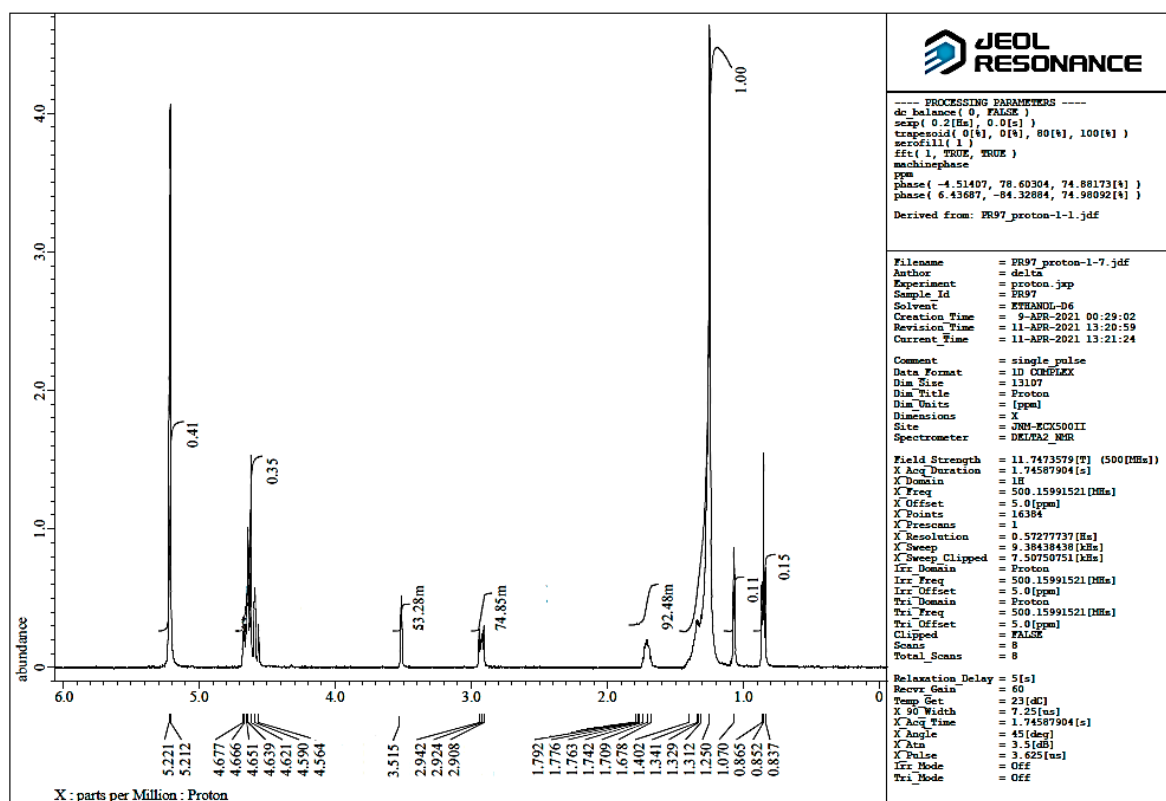
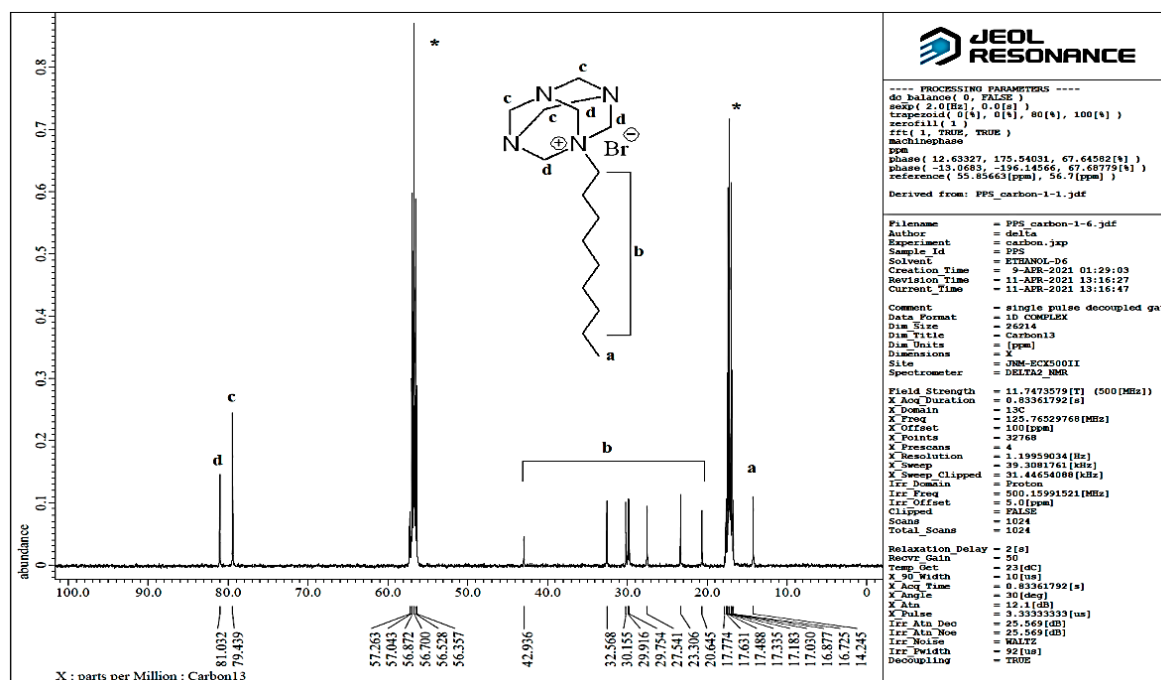
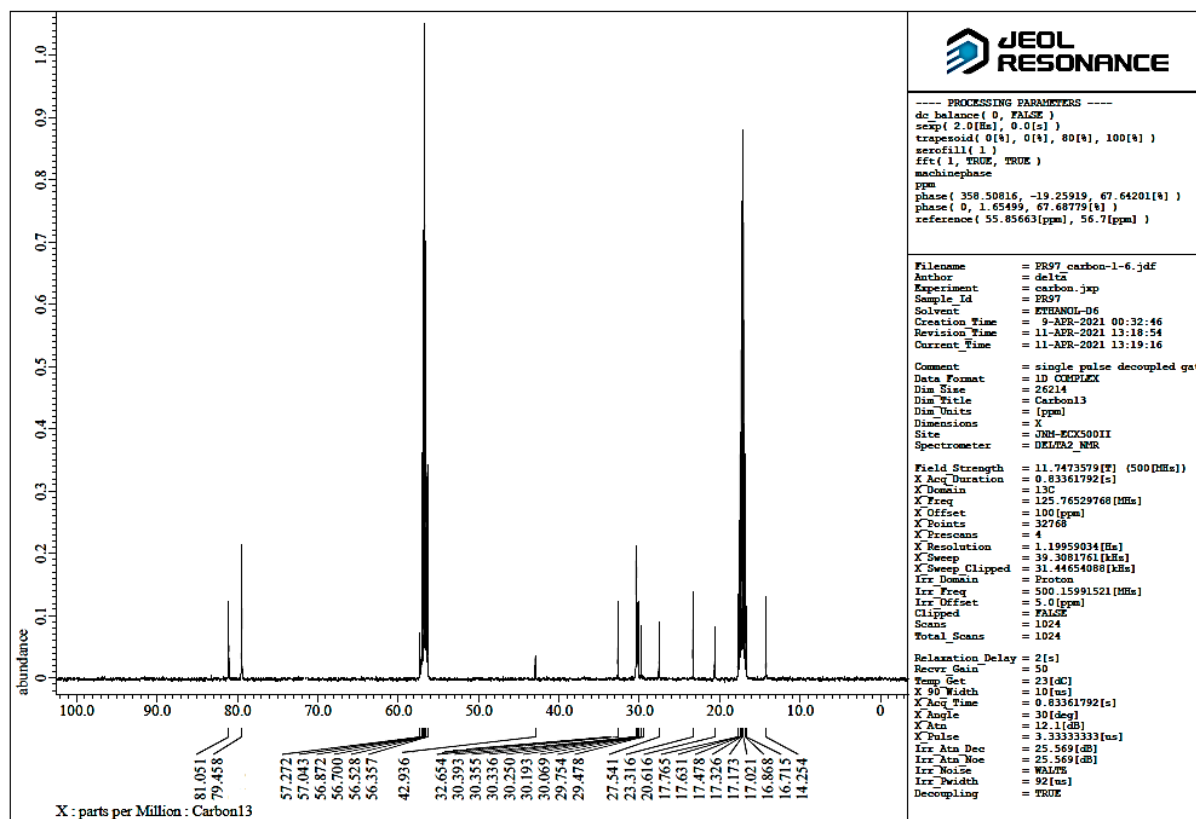


Figure S2. ¹H NMR spectra of QHETA-9. (500 MHz, Ethanol-*d*₆)



Figure S5. ^{13}C NMR spectra of QHETA-14 (125 MHz, Ethanol- d_6).

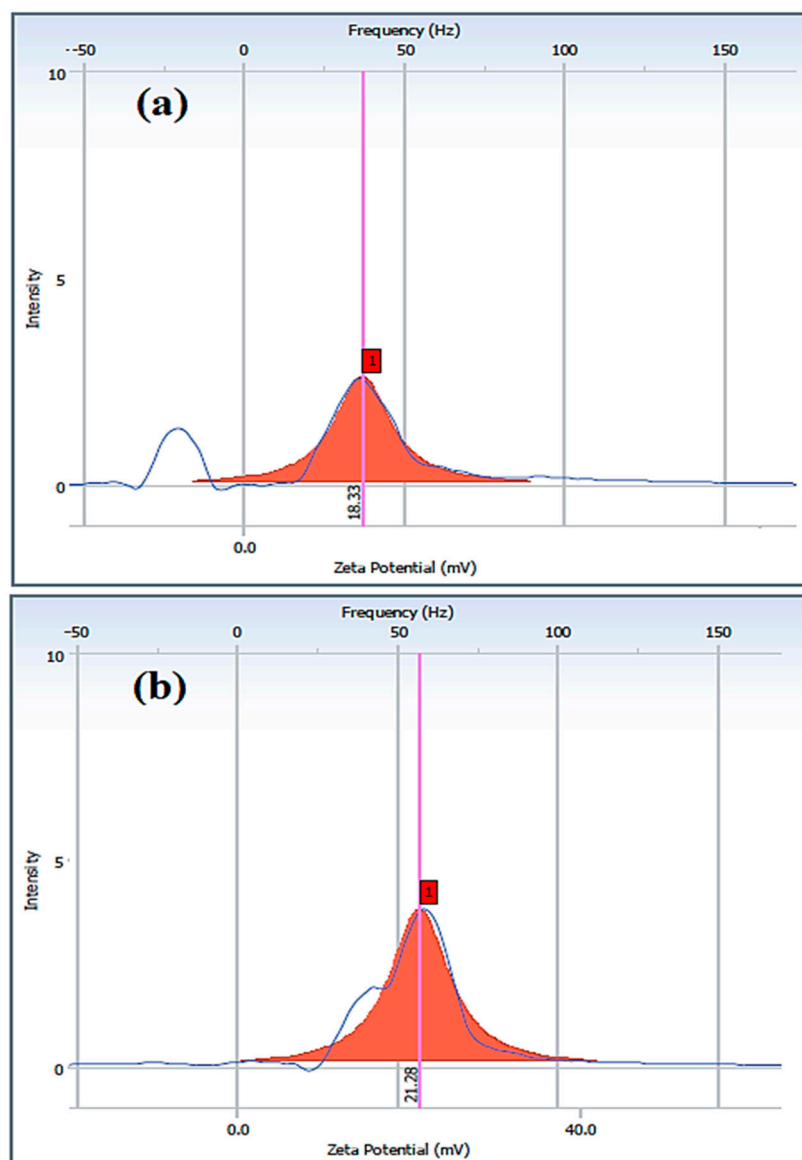


Figure S6. Zeta potential measurements of a) QHETA-14 and b) QHETA-9.

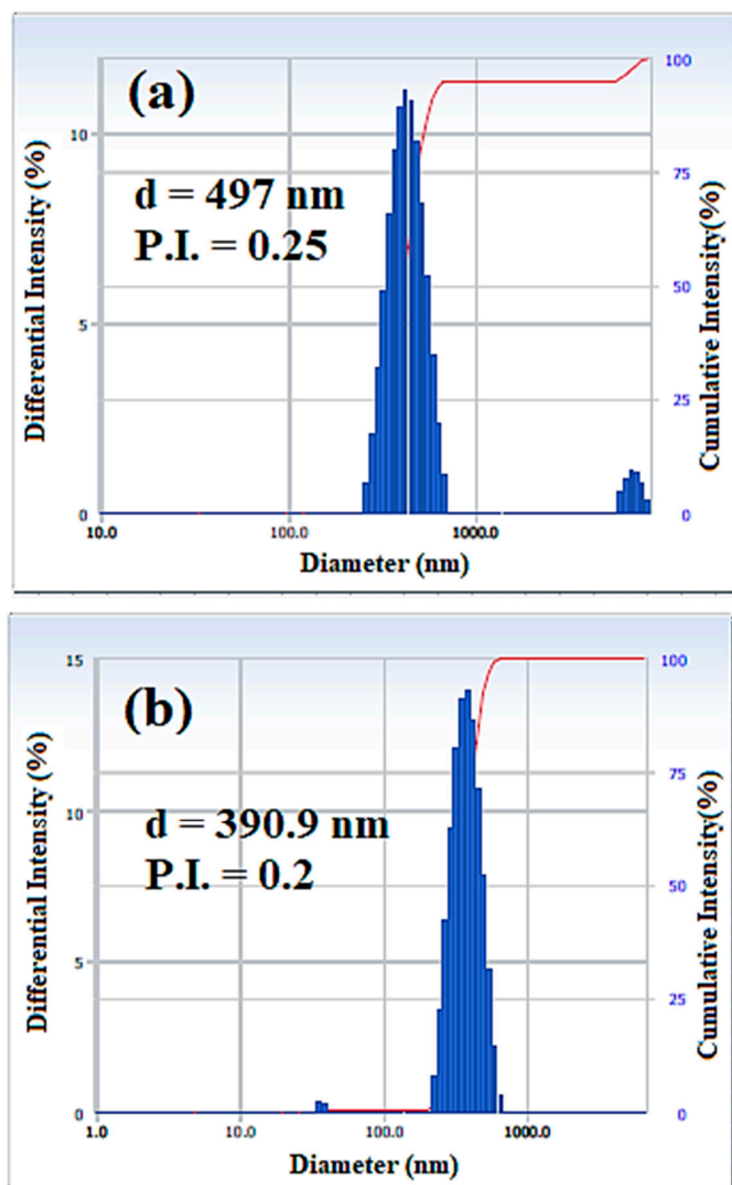


Figure S7. Particle size distributions of a) QHETA-14 and b) QHETA-9 at their cmc and at 25 °C.

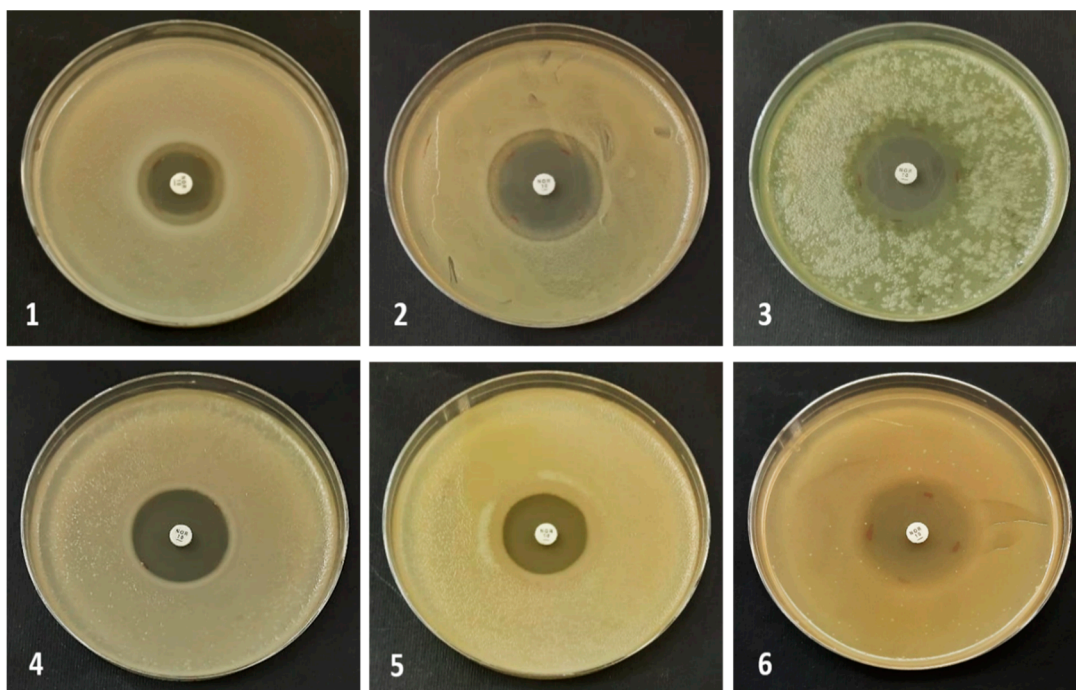


Figure S8. Effect of the antibiotic Norfloxacin 10 µg cobncentraion as standered material on bacterial growth of bacteria strains including: *S. aureus* (1), MRSA (2), *E. faecalis* (3). *A. tumefaciens* (4), *E. carotovora* (5) and *E. coli* (6).