

# Synthesis and Performance of Double-chain Quaternary Ammonium Salt Glucosamide Surfactants

Lifei Zhi\*, Xiufang Shi, Erzhuang Zhang, Chuangji Gao, Haocheng Gai, Hui Wang, Zhenmin Liu and Tieming Zhang

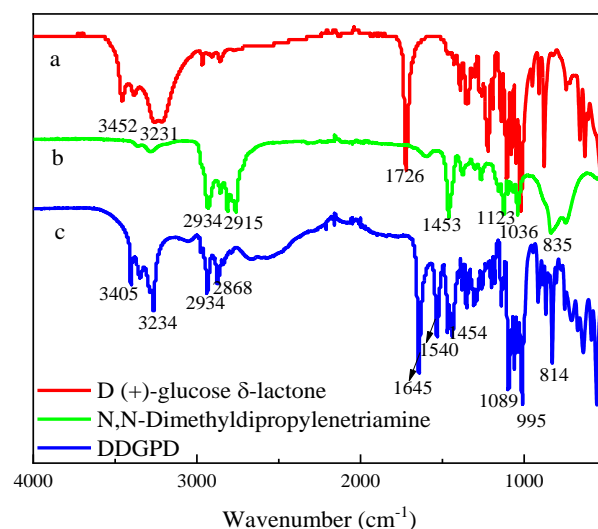
College of Chemistry and Biological Engineering, Taiyuan University of Science and Technology, Taiyuan, , 030024, China; sxf769593427@163.com (X.S.); s20202111007@stu.tyust.edu.cn (E.Z.); 201921020119@stu.tyust.edu.cn (C.G.); 201921070122@stu.tyust.edu.cn (H.G.); gxx125@126.com (H.W.); zhm-liu@tyust.edu.cn (Z.L.); 2011061@tyust.edu.cn (T.Z.)

\* Correspondence: lifeizhi@yeah.net; Tel.: +86-13068002395

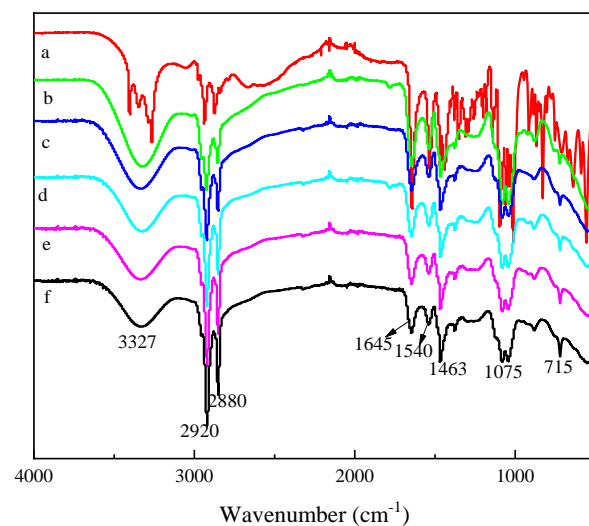
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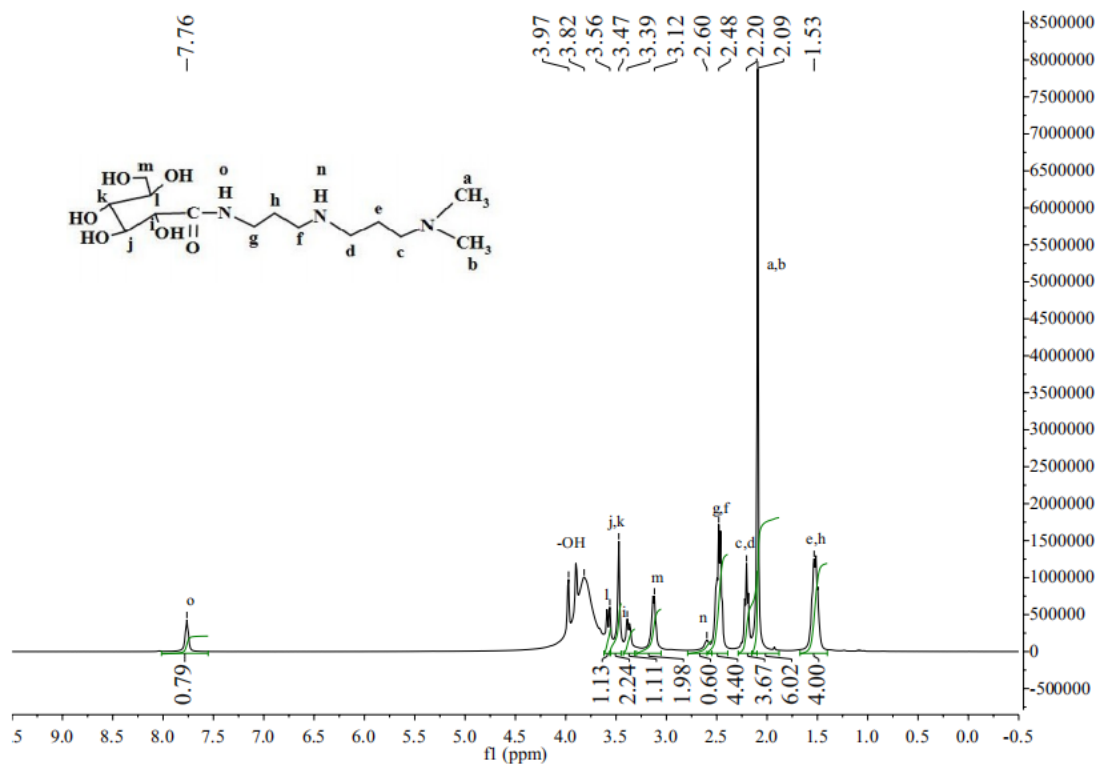
Characterization of C<sub>n</sub>DDGPB



**Figure S1.** Comparison of infrared spectra of (a) D (+) - glucose  $\delta$  -lactone, (b) N,N-dimethyldipropylenetriamine and (c) DDGPD comparative IR spectra.



**Figure S2.** (a) DDGPD, (b) C<sub>8</sub>DDGPB, (c) C<sub>10</sub>DDGPB, (d) C<sub>12</sub>DDGPB, (e) C<sub>14</sub>DDGPB, (f) C<sub>16</sub>DDGPB comparative IR spectra.



**Figure S3.** <sup>1</sup>H-NMR spectrum of DDGPD.

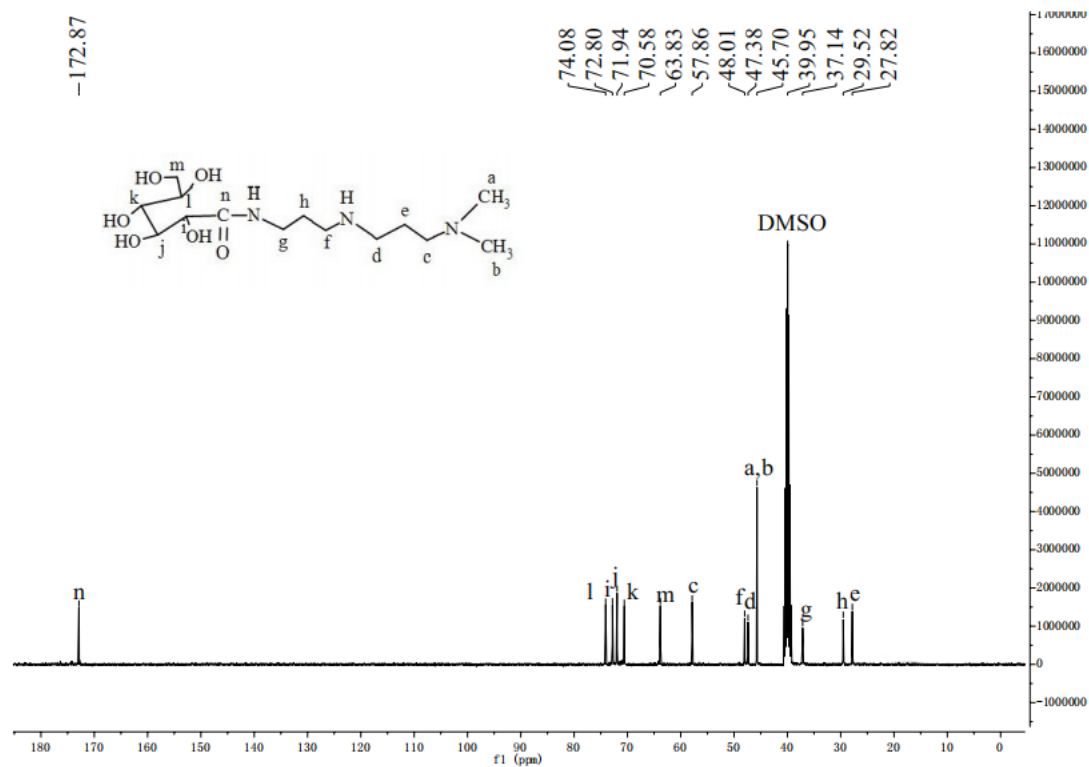


Figure S4. <sup>13</sup>C-NMR spectrum of DDGPD.

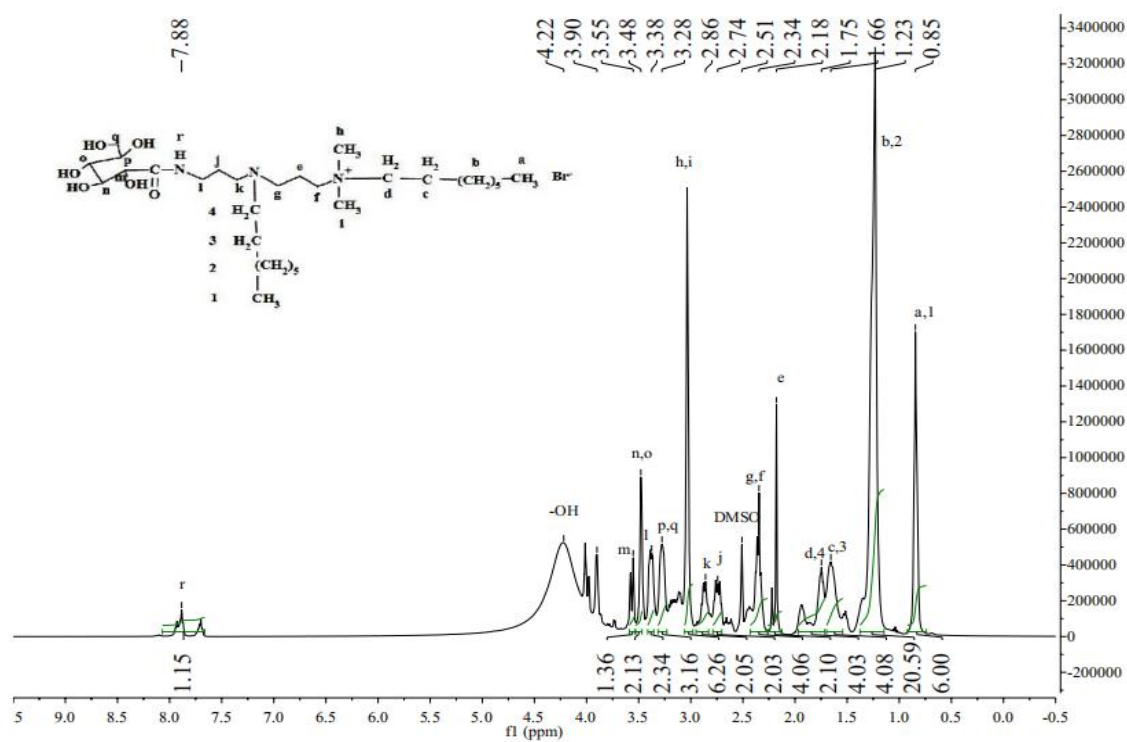


Figure S5. <sup>1</sup>H-NMR spectrum of CsDDGPB.

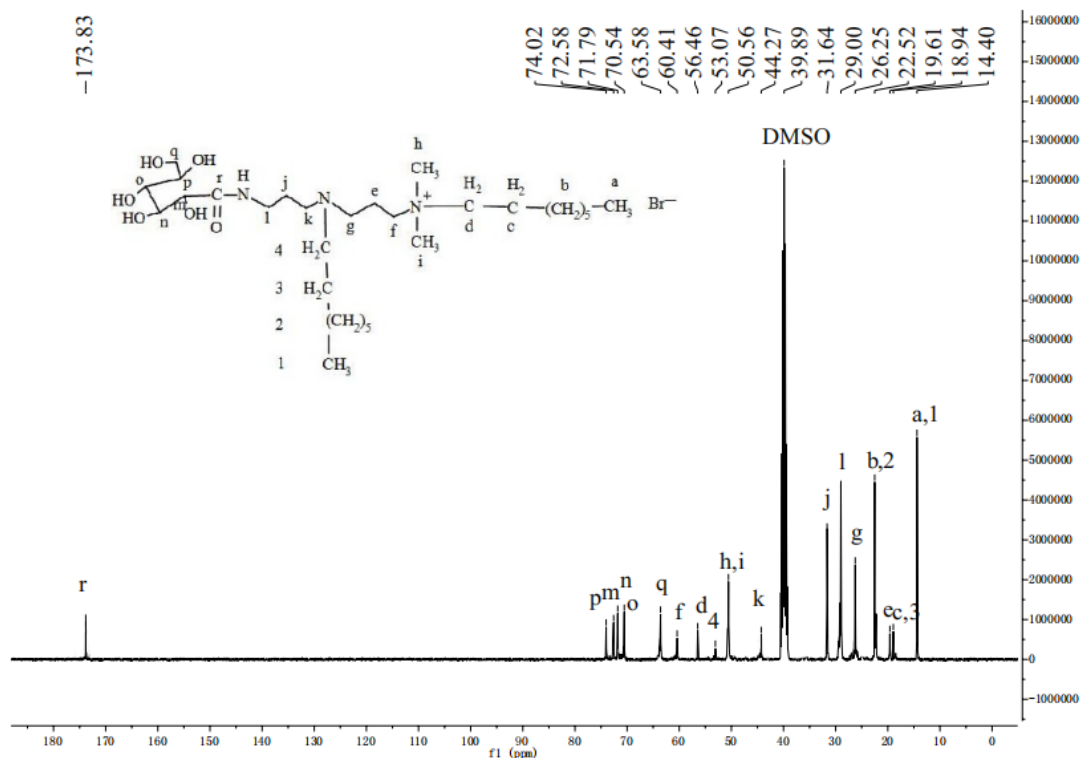


Figure S6.  $^{13}\text{C}$ -NMR spectrum of C<sub>8</sub>DDGPB.

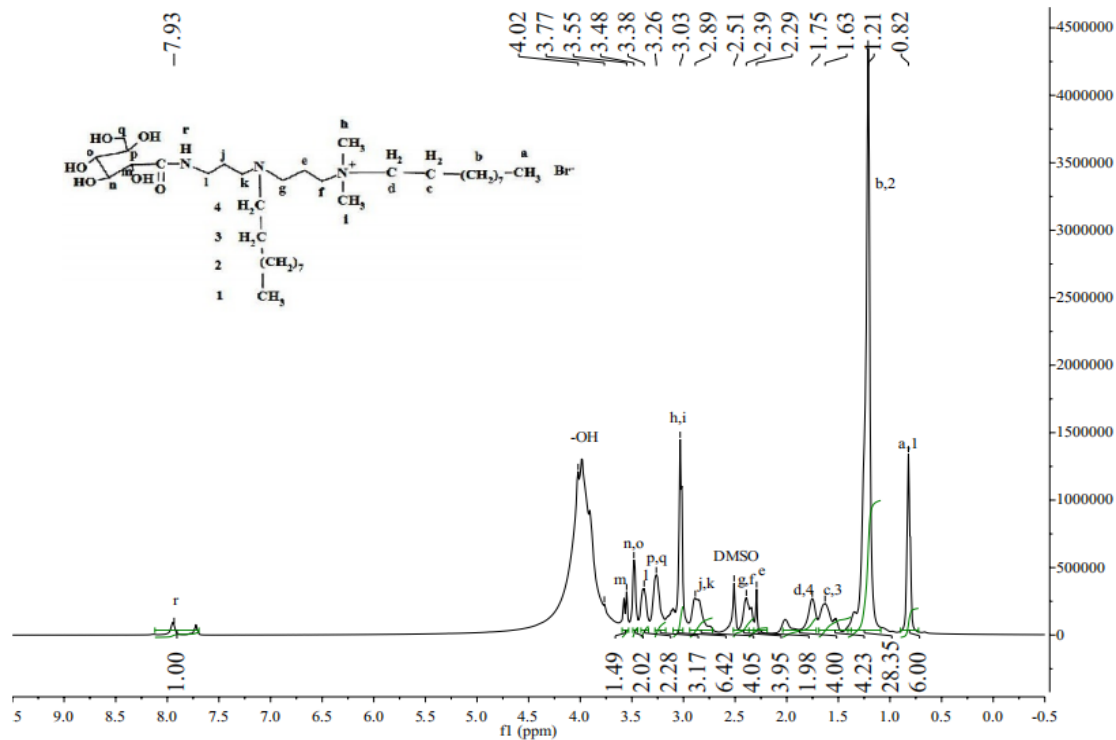
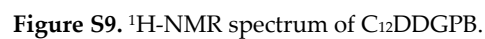
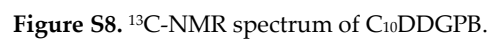


Figure S7.  $^1\text{H}$ -NMR spectrum of C<sub>10</sub>DDGPB.



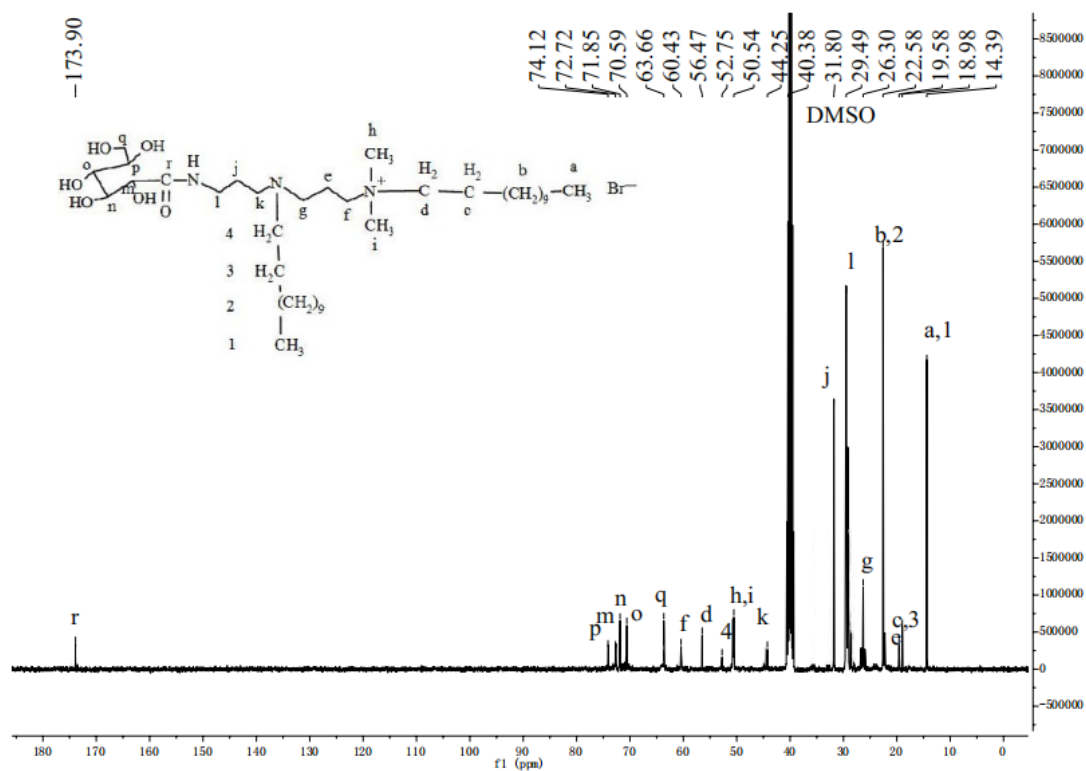


Figure S10. <sup>13</sup>C-NMR spectrum of C<sub>12</sub>DDGPB.

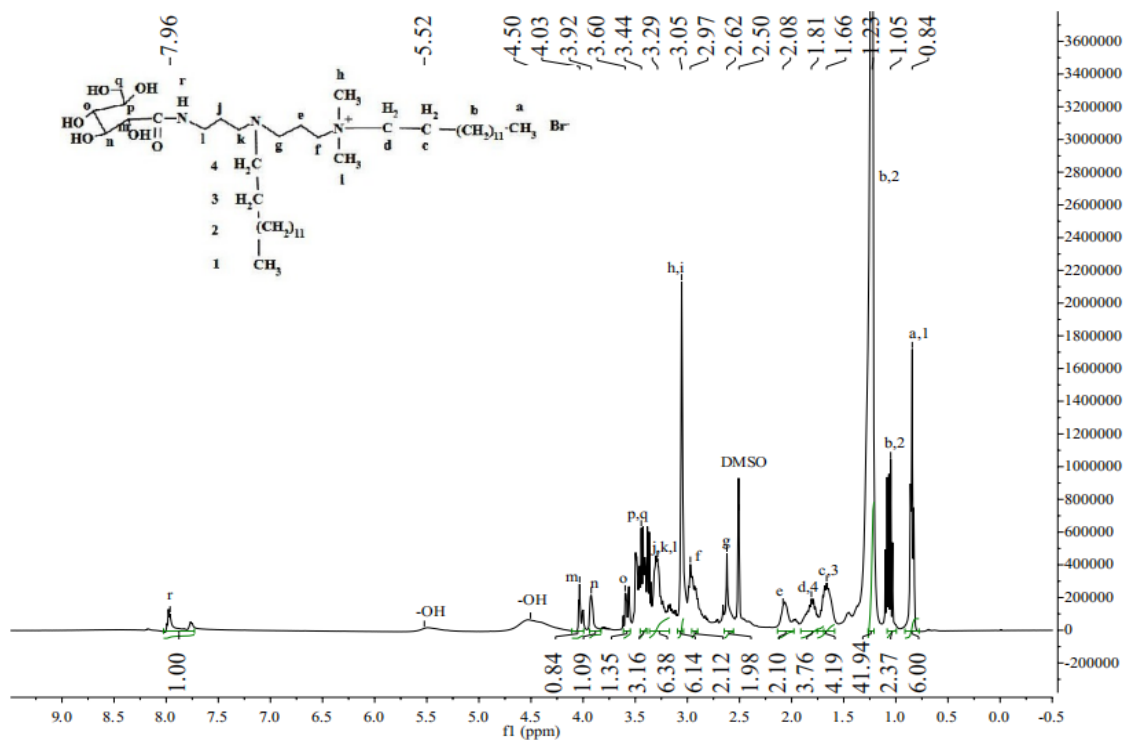


Figure S11. <sup>1</sup>H-NMR spectrum of C<sub>14</sub>DDGPB.

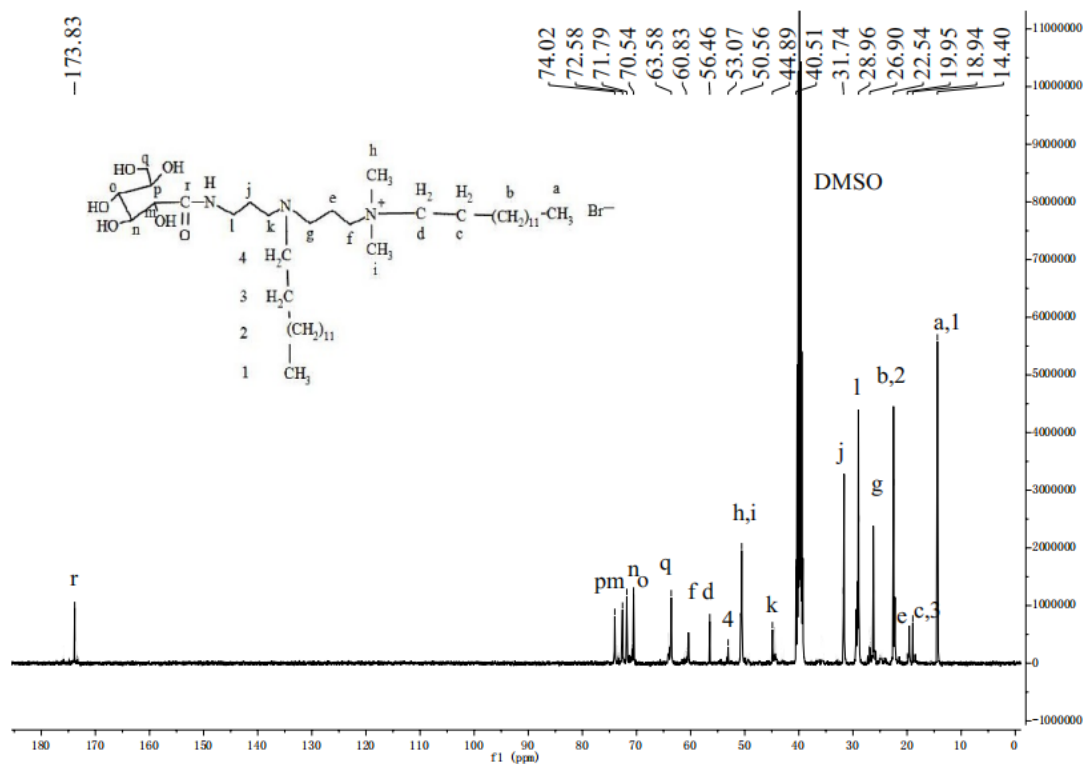


Figure S12. <sup>13</sup>C-NMR spectrum of C<sub>14</sub>DDGPB.

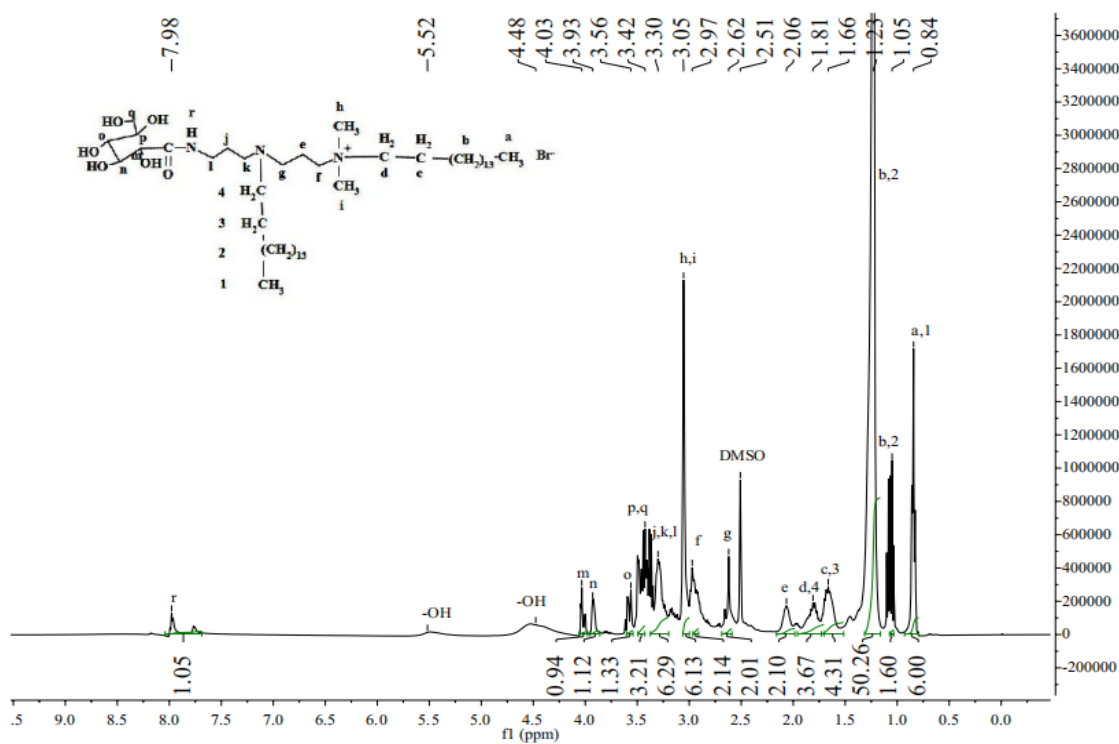
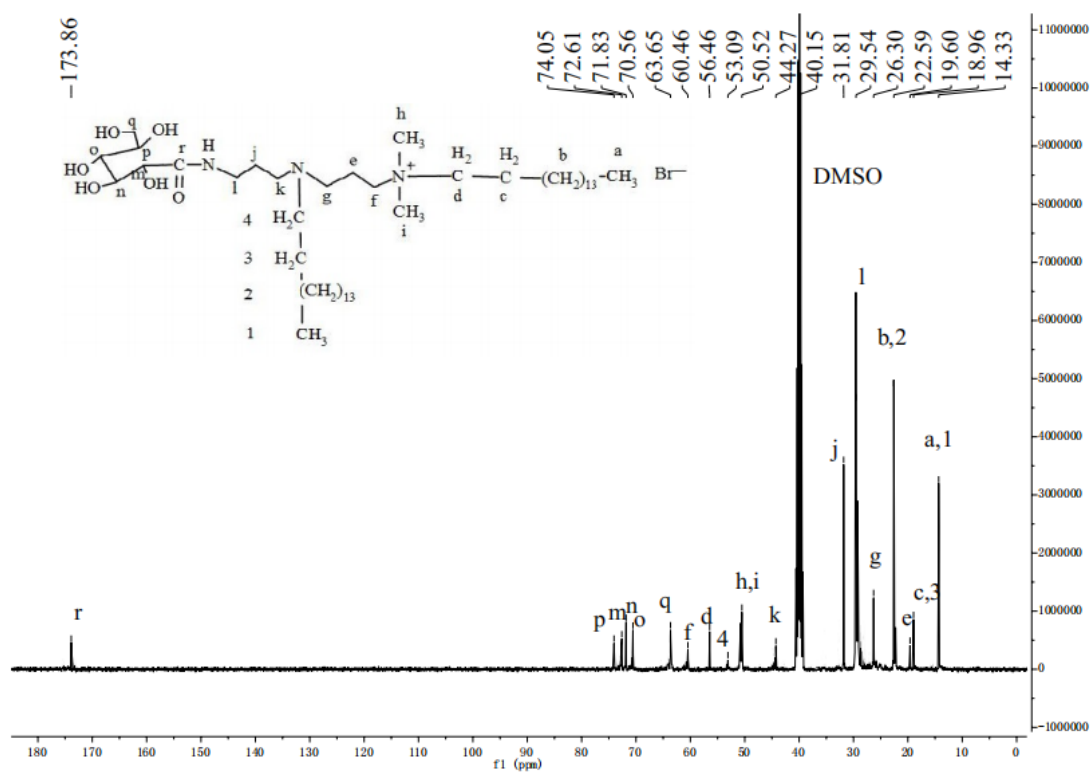


Figure S13. <sup>1</sup>H-NMR spectrum of C<sub>16</sub>DDGPB.



**Figure S14.** <sup>13</sup>C-NMR spectrum of C<sub>16</sub>DDGPB.