CHAPTER IV

CONCLUSIONS

4.1 Conclusions

Synthesis

The structures of all synthesized compounds were endorsed by physical properties and spectroscopic evidences such as IR and ^{1}H-NMR. There are new five compounds (*N*,*N*-phenyl-D-gluconamide, *N*-benzyl-D-gluconamide, *N*-phenethyl-D-gluconamide, *N*,*N*-diethyl-D-gluconamide and *N*,*N*-diphenyl-D-gluconamide) and one previously known (*N*- octadecyl-D- gluconamide), mostly sugar-based surfactants were synthesized and some of their surface properties were characterized and compared with those of commercial nonylphenol ethoxylates. The syntheses generally gave high yields in one step. Several synthesis procedures can be scale up for industrial production. The costs of all starting materials and processes are relatively low.

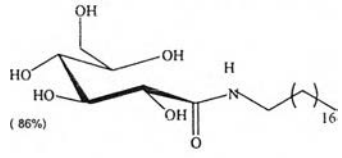
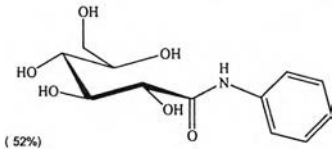
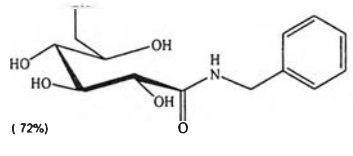
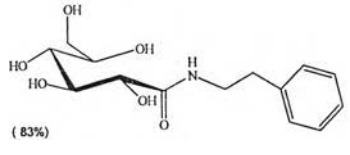
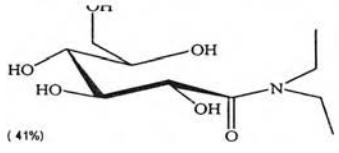
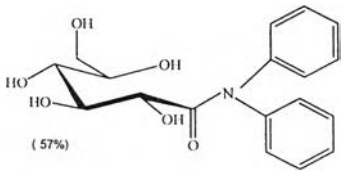
Characterization

A number of conclusions can be drawn from the results of surface characterizations. Several surfactant properties are investigated and discussed, and it appears that some surfactants could be developed as good commercial candidates for both trivial and more complex applications. It should be noted that all surfactants tested are monosaccharide derivatives.

For alkyl/aryl-D-gluconamides **1C-6C**, it was shown that D-gluconamides with small hydrophobic moieties were good hydrotropes.

Surface properties have been characterized and compared with commercial nonylphenol ethoxylates of 4 and 40 ethylene oxide units. The results are presented as shown in Table 4.1. The surface tension was decreased with increasing the surfactant concentration compared with the surface tension of purified water. Most sugar-based surfactants were water soluble. The wettability on a hydrophobic parafilm surface to be nonwetting, but better than water was found generally to process poor wetting. The increasing of contact angle in wetting property was obtained by increasing the number of carbons in hydrophobic part of surfactant. The foaming ability was poor and decreased with increasing the bulky of hydrophobic part.

Table 4.1 Characteristics and surface properties sthesized of gluconamide

Chemical Structure	Surface tension %w/v	Surface tension γ (mN/m)	Solubility limits (%w/v) H_2O	Solubility limits (%w/v) εtOH	Solubility limits (%w/v) Dodecane	HLB	Contact angle (θ)	Foam Ability (mm)
Octadecyl-D-gluconamide 1C  (86%)	0.1 1.0	70.40 68.61	0.1	0.15-1	0.01-0.15	8.0	76.5	0
N-phenyl -*D*- gluconamide 2C  (52%)	0.1 1.0	66.83 64.23	>1	0.15 – 1	< 0.01	13.1	71.0	3 ± 0.5
N-benzyl -*D*- gluconamide 3C  (72%)	0.1 1.0	72.60 69.63	>1	0.15 - 1	< 0.01	12.5	77.0	0.5 ± 0.5
N-phenethyl -*D*- gluconamide 4C  (83%)	0.1 1.0	67.84 59.87	>1	0.15 - 1	< 0.01	11.9	78.7	0.5 ± 0.5
N,N-diethyl -*D*- gluconamide 5C  (41%)	0.1 1.0	64.08 48.37	>1	>1	< 0.01	14.2	81.0	3 ± 0.5
N,N-diphenyl -*D*- gluconamide 6C  (57%)	0.1 1.0	68.26 62.15	>1	0.15 - 1	0.01 -0.15	10.3	80.5	4 ± 0.5
NP4	0.1	30.00	0.15 - 1	>1	0.15 - 1	4.6	28. 1	10
NP40	0.1	45.00	>1	>1	< 0.01	18.0	31.3	>30
Pure water	-	73.00	-	-	-	-	98.0	-

4.2 Suggestion for future work

There surfactants including *N*- phenyl–D-gluconamide (**2C**), *N,N*- diethyl-D-gluconamide (**5C**) and *N,N*-diphenyl–D-gluconamide (**6C**) have good surface tension perproty a high solubility low foamability. These properties are suitable for future application that required low foam, *e.g.*, diswashing liquids for machine washing. It would be interesting to see the results in a continuation of this project, since cheap starting material are always commercially interesting.