

Table 3: The relative stabilities of ester-based muds ($M_1, M_2 & M_3$) compared to (M_R)

Mud	Hours of aging at 350°F	A.V (CP)	P.V (CP)	Y.P lb/100ft ²	Gel strength lb/100ft ²		Filter loss (ml)
					G ₁₀ sec	G ₁₀ min	
M_R	0	40	25	42	5	6.3	2
	16	38	21	38	4	6	1.8
M_1	0	65	34	37	6	7	2.3
	16	52	30	33	5.5	6.5	2.1
M_2	0	60	41	38	6	7.5	2.2
	16	46	38	33	5.5	7	2
M_3	0	53	34	46	5.5	7	2
	16	41	29	39	5	6.5	1.7

4. Conclusion

In this study the ability castor oil (inedible oil) to undergo chemical modifications and renewable nature. Ricinoleic acid (hydroxyl fatty acid) is the meager constituent fatty acid in castor oil (85 – 95%) is a based component in the esterification reaction. Esterification Reaction of Ricinoleic acid (hydroxyl fatty acid) produces novel synthesis castor- based polyester". The based polyesters were successfully synthesized by using the one-step. The new prepared polyesters (HD₃₅, HD₅₅ and

HD₇₅) were chemically confirmed and have a high degree of degradability (Environmentally friendly). The polyesters-based mud ($M_1, M_2 & M_3$) shows results combatable to API specifications and reference sample, which is accepted to the international company.

- 1) Rheological properties of the novel prepared polyester-based mud performed a superior results compared to the reference ester – based mud (M_R).
- 2) HP – HT filter lossat (350 F° – 500 psi) for the ester – based muds formulated with the new prepared polyesters ($M_1, M_2 & M_3$) were compared to the reference ester – based mud (M_R). The results were 2.3 ml for ester – based mud (M_1), 2.2 ml for ester – based mud (M_2), while (M_3), 2 ml same to (M_R) filter loss .both ($M_1 & M_2$) were computable with filter loss of the reference sample (M_R).
- 3) Ester-based mud formulated with the new prepared polyesters ($M_1, M_2 & M_3$) give a good degree of stabilities compared to the reference ester-base mud (M_R) after aging for 16 hours at 350 F°, high hydrostatic pressure and continuous circulation.

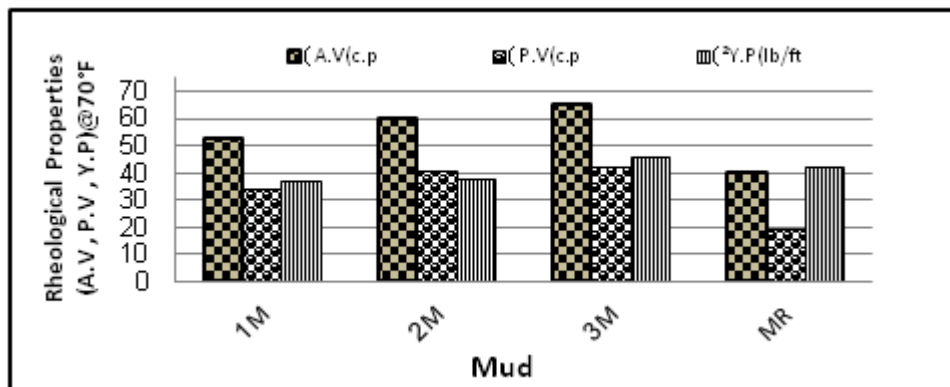


Figure 5: Rheological properties of synthetic esters-based mud ($M_1, M_2 & M_3$) compared to refers sample (M_R)

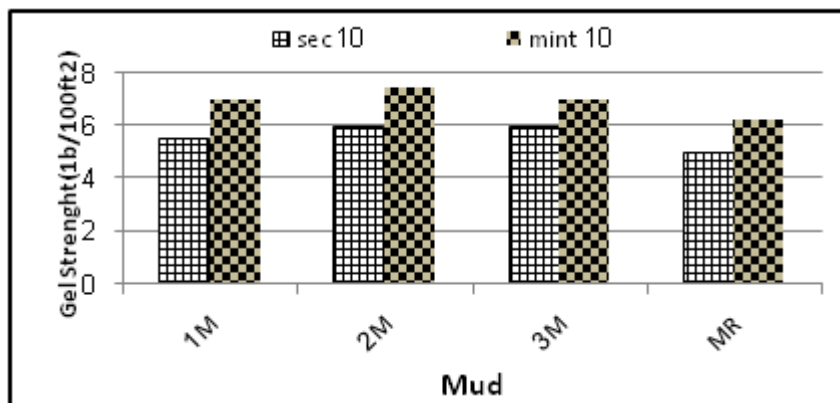


Figure 6: Gel Strength of synthetic esters-based mud ($M_1, M_2 & M_3$) compared to refers sample (M_R)

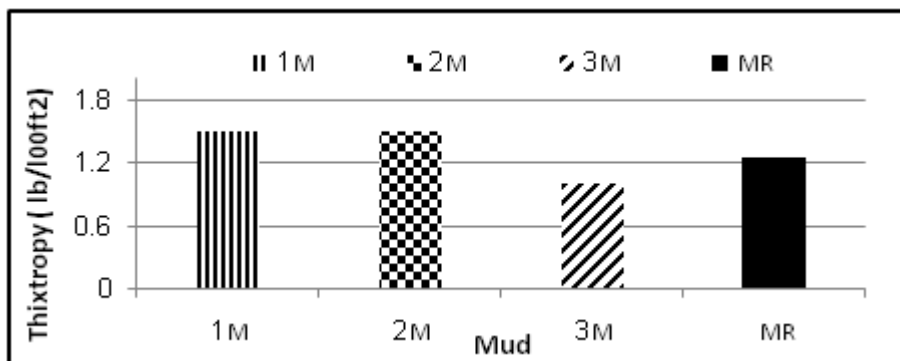


Figure 7: Thixotropy of synthetic esters-based mud (M_1, M_2 & M_3) compared to refers sample (M_R)

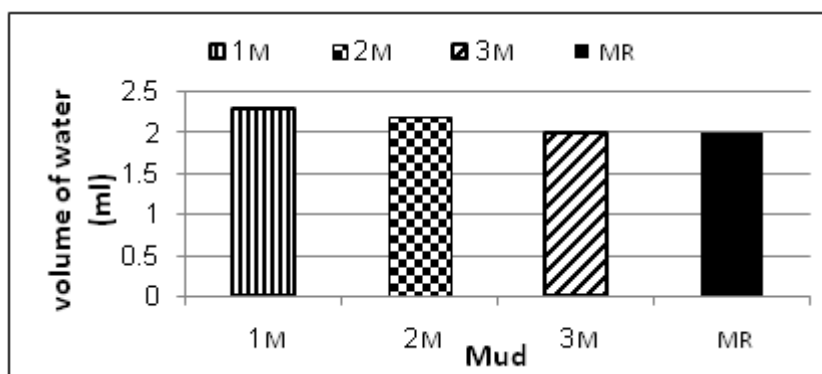


Figure 8: Filter loss (ml) of synthetic esters-based mud (M_1, M_2 & M_3) compared to refers sample (M_R)

5. Acknowledgment

This research was supported by funding from drilling Egyptian company Dr. Mahmoud Saleh -DFT Director, Dr. Said El Kirsh -Lab Supervisor.

References

- [1] Skalli.L, Buckley.J.S.,Zhang.Y, Morrow.N.R, J.Pet.Sci.Eng.,(52), P. 253-260 (2006).
- [2] Morten Thorne Schaanning, Hilde CecilieTrannum, SigurdOxnevad, JoLynn Carroll, Torgeir Bakke ,Journal of Experimental Marine Biology and Ecology (361), P. 49-57 (2008).
- [3] Grant, A. Briggs, A.D.,Mar. Environ. Res. (53), P. 95-116 (2002).
- [4] Moritis,G, oil&gase, (109),P.68-70,(2011).
- [5] Candler J.SPE Intl. conference on health, safety and environmental, Stavanger,Norway,26-28jun(2000).
- [6] Mutlu, H, Meier, MAR., European Journal of Lipid Science and Technology 112 (1) P.10-30 (2010).
- [7] Frank D. Gunstone, John L. Harwood, Albert J. Dijkstra.,The Lipid Handbook. 10: CRC Press. p. 1472. (2007).
- [8] Onukwli, O. D., &Igbokwe, P. K. Production and characterization of castor oil- modified alkyd resins. J. Eng. Appl. Sci., (3), P.161-165 (2008).
- [9] Ahmed S., Ashraf S.M., Naqvi, F., YadavS.,andHasnat A., Journal of Polymer Material ,vol. 18 , P. 53-60(2001).
- [10] Patel, and Arvind; "The Effects of Molecular Composition of Synthetic Base Fluids on Drilling Elastomers" paper No.01112, NACE Corrosion, Houston, 11-16 Mar (2001).
- [11] Ahmed S., Ashraf S.M., Naqvi, F., Yadav S., and Hasnat A.; Progress in Organic Coatings, (47), P. 95-102 (2003).
- [12] Bhunia H.P., Nando G.B., Chaki T.K., Basak A., Lenka S., and Nayak L.; Europe Polymer journal, (38), P. 1381-1399 (1999).
- [13] Shende P.G., and Dabhade S.B.; "Polymer Synthesis and Application, Proceedings of the National Seminar on Polymers" D.K. Vohra, D. Singh, P. Singh (Eds.), Allied Publication Ltd., P. 104-110 (1997).
- [14] Aigbodion A.I., Pillai C.K.S., Bakare I.O., Yahaya, L.E., Indian Journal of Chemical Technology, (8) , P. 378-384 (2001).
- [15] Trevino A.S., Trumbo D.L.; Journal of Progress in Organic Coatings, (44), P. 49-54(2002).
- [16] Patel J.V., Soni P.K., and Sinha V.K., Journal of Science Industrial Research, (58), P. 5793-5799 (1999).
- [17] Mcgregor W.M., Fornara D., and Pellizzon T., Journal of Surfactants Detergents, (41), P. 220-224(2004).
- [18] Rider, T.H., Journal of the American Chemical Society (53) P. 4130-4133(1931).
- [19] Gabriel O.,Oladipo1., Ighodalo C., Eromosele1 &Olujinmi M. Folarin, Environment and Natural Resources Research; (3), No. 3; (2013).
- [20] ShahlaAtaei,RosiyahYahya,Seng Neon Gan, J Polym Environ (2011).
- [21] Patton TC., Alkyd resin technology. Interscience Publisher, John Wiley and Sons, New York (1962).
- [22] Steber J., Herold C.P., Henkel K.A., and Limia J.M.; Journal of Offshore, vol. 54(9), P. 3105- 3118 (1995).
- [23] Tehrani,A.,Annual Transaction of the Nordic Rheology Society. Aberdeen,UK(2007).
- [24] Sadek,Z.K., Ashraf,S.I.,Eur.j.sci.res.(57)P.68-86(2011).
- [25] Zamora,M.,Power,M.,AADE Technology Conference Drilling &Completion Fluids and Waste Management, Houston ,USA (2002).
- [26] Nasiri,M.,Ashrafizadeh,S.N.,Ghalambor,A.,J.Energ.Tech nol.(131) P.013103-013110(2009).
- [27] Bobalek, E. G., Moore, E. R., Levy, S. S., & Lee, C. C. .J. Appl. Poly.Sci., 8, 625-657, (1964).
- [28] Piddington CS., Kovacevich BR., and Rambosk J.; Journal of Application Environmental Microbial, vol. 61(2), P. 468-475 (1995).

- [29] Benson H.J., Microbiological applications, sixth Ed., Wm.C.Brown Publishers, P. 447(1994).
- [30] American Petroleum Institute. Recommended practice, standard procedures for oil field testing, API recommended practice 13B-2, third edition, 5-11 (1998).
- [31] Lahalih S.M., and Dairanieh I.S.; Journal of European Petroleum, vol. 25, P. 187-192 (1989).
- [32] Aigbodion AI, Okieimen FE., EurPolym J, P.32:1105(1996)
- [33] Satheesh Kumar MN, Yaakob Z, Maimunah S, Siddaramaiah,
- [34] Abdullah SRS.,J Polym Environ P.18:539(2010).
- [35] Goldsmith HA IndEngChemP.40:1205(1948).
- [36] Bobalek, E. G., Moore, E. R., Levy, S. S., & Lee, C. C. ,J. Appl. Poly.Sci., 8, 625-657 (1964).
- [37] Onukwli, O. D., &Igbokwe, P. K. , J. Eng. Appl. Sci., 3, 161-165, (2008).
- [38] 37. Steber, J and Herold, C-P Comparative evaluation of anaerobic biodegradability of hydrocarbons and fatty derivatives currently used gas drilling fluids. Chemosphere (31) No. 4: 3105-3118(1995).

Author Profile



Dr. Suzan El Desouky El Sayed Ibrahim, Egyptian
Petroleum Research Institute (EPRI)