Ministry of Higher Education
and Scientific Research
University of Technology
Chemical Engineering Department

Treatment of Wastewater Associated With Crude Oil in Reservoirs

Project

Submitted to the Department of Chemical Engineering of The University of Technology in Partial Fulfillment of the Requirement for the Degree of Higher Diploma of Science in Chemical Engineering/Petroleum Refining Oil and Gas

By

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(B.Sc. Chemical Engineering 2008)

Under Supervision of
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2015

Abstract

The produced water or wastewater discharge from the South Oil Company/ Zubair1 Warehouse causes high pollution to the agricultural lands. The present study aims to find the possibility method for treating such oily wastewater, by coagulation, flocculation, sedimentation and adsorption. The experimental tests dealt with the characteristics and analysis of natural produced water from location such as turbidity, pH, TDS, TSS, and oil content have found out that oil content = 137 mg/L and turbidity = 122 NTU. The present work deal with the efficiency of coagulation, flocculation, sedimentation and adsorption for the removal of oil and turbidity in produced water associated with crude oil in reservoir. The produced water treated is with four types of chemical additives : poly aluminum chloride, alum, bentonite and zeolite. Two types of coagulant are used (Poly aluminum chloride and Alum) and two other types of adsorbent (Bentonite and Zeolite) are used, too. The experiments of coagulation, flocculation and sedimentation have been conducted through the use of a Jar-Test (laboratory scale) and the experiments of batch adsorption have been conducted by using a magnetic stirrer at different times, speed and concentration of adsorption.

In the individual case, the experimental results of the jar test to remove the oil content, the best dose of (poly aluminum chloride and alum) is (3, 35 mg/L) to obtain R% (96.3, 93), respectively. And also in the removal of the turbidity, the best dose of (poly aluminum chloride and alum) is (6.75, 30 mg/L) to obtain R% (99, 98.9), respectively . In the combined case, the best dose for removal of the oil content by using (poly aluminum chloride and alum) is (3, 20 and 5.25, 35 mg/L) to obtain R% (96.3 and 93), respectively. And also removal of the turbidity, the best dose of (poly aluminum chloride and alum) is (6.75, 45 and 4.5, 30

mg/L) to obtain R% (99 and 98.9), respectively. In the individual case, the experimental results of adsorption at the magnetic stirrer to remove the oil content, the best weight of adsorbent, stirrer time and stirrer speed for bentonite and zeolite (cation and anion) were (1, 6 and 6 gram), (120, 15 and 10 minute) and (920, 1080, 920 rpm) to obtain R% (87.1, 97 and 98), (94.1, 97.8 and 97.4) and (99.2, 98.8 and 98.6), respectively. In the combined case, the best weight, stirrer time and stirrer speed to remove the oil content by zeolite cation and zeolite anion was (6, 6 gram), (15, 10 minute) and (1080, 920 rpm) to obtain R% (97, 98), (97.8, 97.4) and (98.8, 98.6), respectively. In the combined case, the best stirring time and stirrer speed to remove the oil content by bentonite and zeolite (cation and anion) were (15, 15 and 10 minute) and (920, 1080 and 920) to obtain R% (94.1, 97.8 and 97.4) and (99.2, 98.8 and 98.6), respectively.

In the individual case, the experimental results of adsorption at the magnetic stirrer to remove turbidity, the best weight, stirrer time and stirrer speed by bentonite and zeolite (cation and anion) were (2, 4 and 4 gram), (120, 15 and 10 minute) and (1080, 600 and 600) to obtain R% (99, 90 and 87.4), (90, 91 and 86) and (97.4, 89.2 and 86.6), respectively. In the combined case, the best weight, stirrer time and stirrer speed to remove the turbidity by zeolite cation and zeolite anion was (4, 4 gram), (15, 10 minute) and (600, 600 rpm) to obtain R% (90, 87.4), (91, 86) and (89.2, 86.6), respectively. In the combined case, the best stirring time and stirrer speed to remove the turbidity by means of bentonite, zeolite (cation and anion) was (15, 15 and 10 minute) and (1080, 600 and 600) to obtain R% (90, 91 and 86) and (97.4, 89.2 and 86.6), respectively. The results for compared between two methods were showed, removing oil content by adsorption (97.8) is better than coagulation (96.3). And the results for removing turbidity by coagulation (99) is better than adsorption (97.4).