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COLLOIDAL GAS APHRON (CGA): A NEW TECHNOLOGY TO REMOVE TOTAL CONTAMINANTS INCLUDING OIL FROM PRODUCED WATER USING FROTH FLOTATION

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This research work is related to water scarcity and lack of water resources in the United Arab Emirates as well as finding other alternatives for water resources. It is estimated that 241 million barrels of produced water associated to oil and gas operations is generated globally every day, expected to grow by 21% to 292 million barrels by 2020. With the combined factors of ageing reservoirs, tightening government regulations and new EOR methods, the importance of maintaining a thorough and reliable produced water treatment process is necessity. Development of an efficient, cost-effective, environmental friendly and sustainable water treatment system will have significant and positive outcomes while minimizing the adverse impacts on the environment. The removal of particulates, heavy metals including oil will be the main focus of this research using Colloidal Gas Aprons (CGAs), a new technology for froth flotation. CGAs, can be termed as micro-foam system with colloidal properties and consist of closely packed spherical bubbles. CGAs were generated from anionic (sodium dodecyl benzenesulfonate) and cationic (hexadecyl trimethyl ammonium bromide) surfactants. Stirring speed of 3000 rpm was maintained to produce CGAs containing 500 mL surfactant solutions to obtain average bubble size of 60 μm . The effects of concentration of contaminants, volume of liquid in the flotation column, CGAs loading rate, and pH of solution on the removal of all the contaminants were examined. Flotation column containing 100 nm iron oxide particles having concentrations 400 mg/L and oils of 100 mg/L removed 41% and 96%, respectively. While, maximum removal of 96% for lead and 81% for copper ions were obtained having mixed metal ion concentrations 100 mg/L at pH of 5.35 and CGAs loading rate of 6.1 cm/min. Thus, CGAs using flotation technique is proved to be an effective procedure for the removal of contaminants from produced water.