Study the physical chemical characteristics of crude oil emulsions and their thermochemical demulsification

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Introduction. The breaking of crude oil emulsions (demulsification) is necessary to avoid problems during the transportation and processing of oil. The presence of water in crude oil is undesirable and can result in pipeline corrosion and increase the cost of transportation because of chloride salt content in aqueous phase of emulsion. Therefore, preparation of oil for processing includes primarily dehydration and desalting of oil.

The aim of the work is to study the physicochemical properties of crude oil of the Kazakhstan fields (Zhanaozen and North-West Konys) which are known by high ability to form stable oil emulsion.

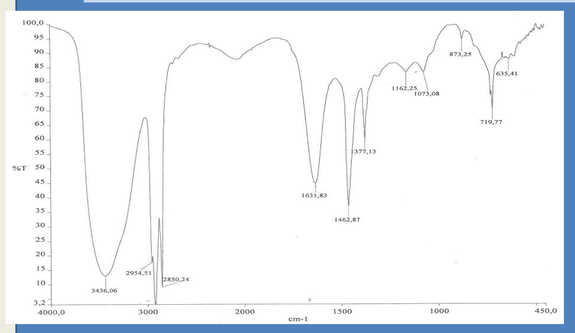


Fig.1 IR-spectra of Zhanaozen crude oil samples

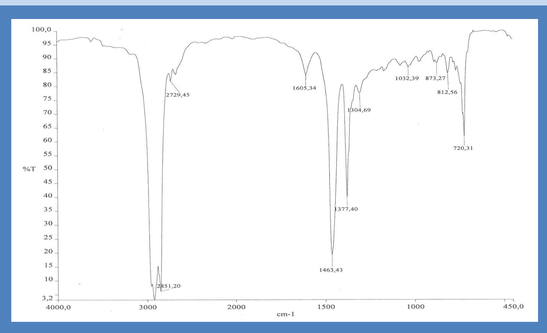
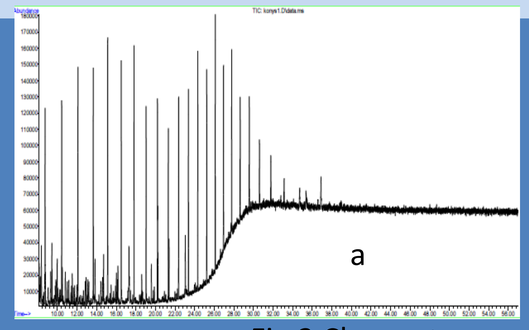


Fig.2 IR-spectra of North-West Konys crude oil samples



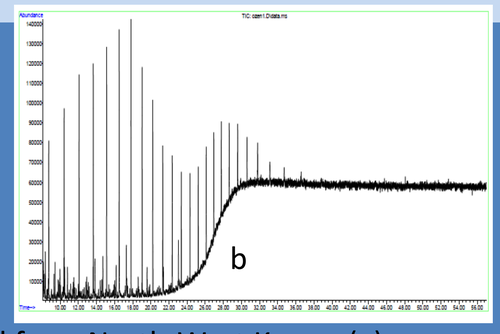
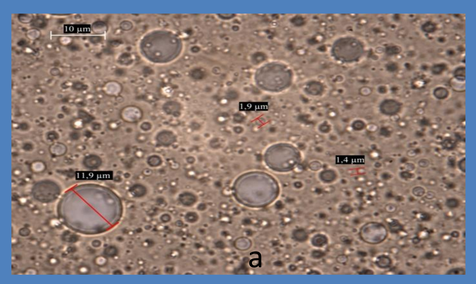


Fig.3 Chromatogram of oil from North-West Konys (a) and Zhanaozen (b) field



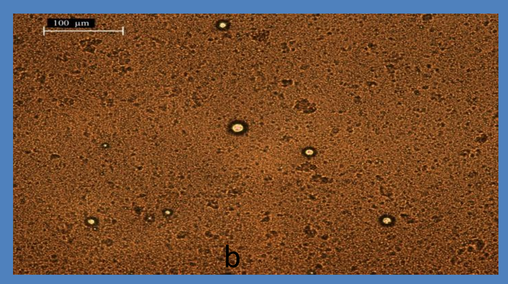


Fig. 4 Samples of oil emulsion's microphotography from North-West Konys (a) and Zhanaozen (b) field

Qualitative and quantitative composition of main stabilizing components of oil emulsions (resins, asphaltenes and high molecular paraffins) was determined. Light oil of Konys oilfield contains 11.5% of paraffins, 0.69% resins, 0.19% asphaltenes. The same measurements were carried out for heavy oil of Zhanaozen where paraffin content exceeds 30%, resins equal to 1.5%; asphaltenes – 0.6%.

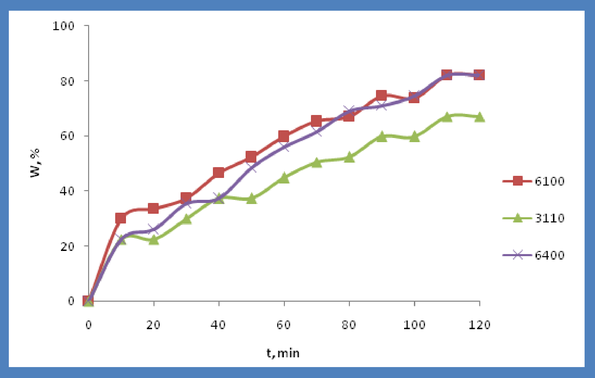


Fig. 5 Effect of different demulsifiers which dissolved in kerosene on thermal dewatering at 60^{0}C

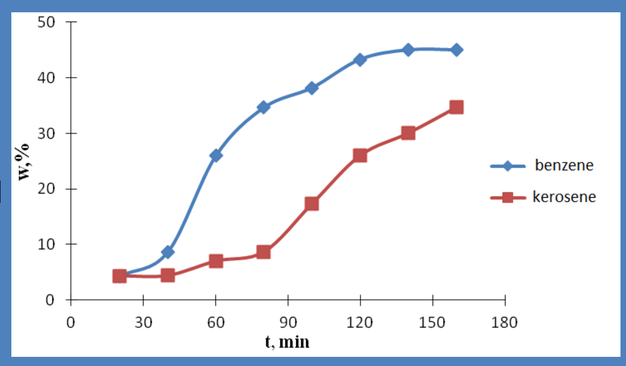


Fig. 6 Dependence of dehydration degree of sample (II) on time. Demulsifier 3110. Treatment temperature 60 ^{o}C

Conclusion. The physicochemical properties of oil emulsions of two different oilfields of Kazakhstan North-West Konys and Zhanaozen relating to the light and heavy oils respectively by density values were studied. It was found that samples relate to fine dispersed oil emulsions by dispersion and to lowstable (Konys) and highly stable (Zhanaozen) oil emulsions by ability to form an emulsion. Commercial pluronics disolved in different solvents show the demulsifying effects at 60 ^{o}C. The results reported contribute to a better understanding of the water/oil demulsification mechanism and selection of effective chemical agents.

References.

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