

## *Abstract*

Erosion is a common problem in many industrial applications, therefore we focused on study the erosion in pipes which are used for conveying crude oil by select three types of crude oil obtained from Baghdad East Field (Al-Khaseb oil (Kh) and Al-Tanoma oil (T)) and from Al-Durra Refinery (Al-Strategie oil (ST)) in absence and presence sand with three particle sizes (600  $\mu\text{m}$ , 850  $\mu\text{m}$  and mixture of two) to study the erosion in two phases (solid particle/liquid).

Steel (A 106) specimens were used to investigate erosion rates by weight loss at different impact angles (30°, 45°, 60° and 90°) the results indicated that the increasing of impact angle led to decreasing erosion rate. The effect of different time for erosion tests (10, 13 and 16) hours was studied and the results showed that increasing time led to increasing erosion. When compared among three types of oil at constant other parameters can be seen that (T) oil more corrosive than others (ST and Kh) oils due to contents of high amount of salt and asphaltenes.

Sherardizing coating was carried out to improve erosion resistance under some conditions of present work. The results the increasing of weight after erosion test which may be due to firstly the chemical reaction between the crude oils, which are contaminated by strange materials, and zinc element in the sherardizing layer. This reaction may lead to the formation of intermetallic compounds of high density and hardness buried within the sherardizing layer and secondly the penetration of sand particles, which are mixed with oil, of high kinetic energy into the sherardizing layer and deposit in this layer.

Optical microscopy and scanning electron microscopy were used to identify the morphology of surface before and after erosion test, and also before and after coating and erosion.

Statistical package for social science (SPSS) was used to study erosion by theoretical prediction. The results are good agreement with experimental results.