# Oil-water emulsion separation via an electro-coagulated hydrocylone

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Oily water generated from petroleum refineries, off-shore platforms etc. should be reduced to a safe level less than 10 ppm before it discharge. Liquid-liquid hydrocylones have been widely used in the oil industries [1]. However, they have limits to reduce highly mixed oil-water emulsion due to small oil droplets [2]. In this study, oil-water emulsion was treated by electrocoagulation in an electrochemical reactor and then large oil droplets in water were separated by a hydrocyclone.

An electrical field of 3.0 kV/m was applied to the electrochemical reactor with an array of cylindrical tubes during 0-120 s. Oil droplets in water (5% v/v) were enlarged from an initial size of about 2 μm to those of more than 20 μm after a reaction of more than 40 s as seen in Fig 1. The enlarged oil droplets were separated by a liquid-liquid type hydrocylone. Separation efficiency was less than 80% with a hydrocylone without electrocoagulation but it was enhanced to more than 95% with an electrocoagulated hydrocylone.

At the low flow rates, oil droplets could be enlarged to bigger sizes in the electrochemical reactor due to longer reaction time but small centrifugal forces could be applied in the hydrocylone. On the other hands, at the high flow rates, oil droplets were electrochemically reacted in shorter reaction time but high centrifugal force could be applied in the hydrocylone. Therefore, the optimum liquid flow rate could be found in the electro-coagulated hydrocylone.

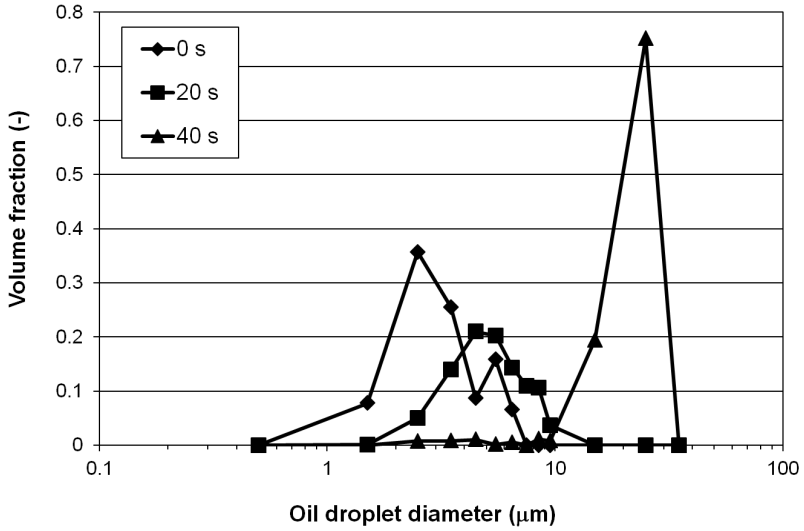


**Figure 1** Oil droplet size distributions of oil-water emulsion (5% v/v) after electro-chemical reactions

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