

**ABSTRACT OF THE DISCLOSURE****COMBINATION COCURRENT AND COUNTERCURRENT STAGED
HYDROPROCESSING WITH A VAPOR STAGE**

A hydroprocessing process includes a cocurrent flow liquid reaction stage, a countercurrent flow liquid reaction stage and a vapor reaction stage in which feed components are catalytically hydroprocessed by reacting with hydrogen. Both liquid stages both produce a liquid and a vapor effluent, with the cocurrent stage liquid effluent the feed for the countercurrent stage and the countercurrent stage liquid effluent the hydroprocessed product liquid. Both liquid stage vapor effluents are combined and catalytically reacted with hydrogen in a vapor reaction stage, to form a hydroprocessed vapor. This vapor is cooled to condense and recover a portion of the hydroprocessed hydrocarbonaceous vapor components as additional product liquid. The uncondensed vapor is rich in hydrogen and is cleaned up if necessary, to remove contaminants, and then recycled back into the cocurrent stage as hydrogen-containing treat gas. Fresh hydrogen is introduced into the countercurrent stage and the countercurrent stage effluent contains sufficient, and preferably all of the hydrogen for the vapor stage reaction.

