

Abstract

PRODUCED WATER TREATMENT PROCESS AT CRUDE OIL AND NATURAL GAS PROCESSING FACILITIES

Embodiments of the invention provide a method for producing a treated water stream. The method includes receiving a feed stream including at least one substance dissolved in a water phase, and processing the feed, water stream in a plurality of stages arranged in operation from a lowest temperature and pressure to a highest temperature and pressure, to produce the treated water stream and a concentrated stream. Each stage includes a vessel, a heat exchanger, an evaporator, and a condenser. Each evaporator is configured to evaporate an amount of water using one of direct heat or indirect heat. Each condenser is configured to condense at least a portion of steam generated by a successive stage. In accordance with various embodiments, the plurality of stages is arranged in series. In other embodiments, the plurality of stages is arranged in parallel.

FIG: 4