

CIRCULAR ECONOMY FOR PLASTIC WASTE TO POLYETHYLENE VIA REFINERY FCC OR FCC/ALKYLATION UNITS

ABSTRACT

Provided in one embodiment is a continuous process for converting waste plastic into recycle for polyethylene polymerization. The process comprises selecting waste plastics containing polyethylene and/or polypropylene, and passing the waste plastics through a pyrolysis reactor to thermally crack at least a portion of the polyolefin waste and produce a pyrolyzed effluent. The pyrolyzed effluent is separated into offgas, a pyrolysis oil and optionally wax comprising a naphtha/diesel and heavy fraction, and char. The pyrolysis oil is passed to a refinery FCC unit from which a liquid petroleum gas C₃ olefin/paraffin mixture fraction is recovered, as well as a C₄ olefin/paraffin mixture fraction. In one embodiment, the pyrolysis oil is first passed to a FCC feed pretreater. The liquid petroleum gas C₃ olefin/paraffin mixture fraction is passed to a steam cracker for ethylene production. The C₄ olefin/paraffin mixture fraction is passed to a refinery alkylation unit, from which a n-butane and naphtha feed for a stream cracker to produce ethylene is recovered.

[Figure 1]