Determining the fouling tendency of different feedstocks in the Fouling Assessment Setup (FAST)

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Abstract: The use of heavier feedstocks, or even the possibility of direct conversion of crude oil into chemicals has created new challenges for the steam cracking processes, as severe fouling in the convection section heat exchangers tubes and transfer line exchangers is observed then. To deal with those issues, a more fundamental understanding about the fouling phenomenon and its relationship with the feedstock composition, and process conditions is required. In order to obtain a better understanding of the fouling tendency of different feedstocks in all the relevant sections of a steam cracker, *i.e.* dry feed preheaters (DFP), dilute feed preheaters I and II (DFPH I and DFPH II), radiant section and transfer line exchanger (TLE) the experimental unit "Fouling Assessment Setup (FAST)" was developed. Its versatile design enables the online assessment of coke formation in the reactor coils, heat exchanger tubes and/or TLE, by weighting the coke deposition on the surface of a metal coupon using a magnetic suspension balance (MSB). In addition, the total amount of carbonaceous deposits in each element of the convection section (DFP, DFPH I and DFPH II) can be determined through an offline decoking process, using an infrared gas analyzer (IR). Furthermore, the online determination of the reactor effluent composition is obtained using a refinery gas analyzer (RGA) and a comprehensive gas chromatography coupled to a flame ionization detector (GC×GC-FID).

