

of SOx, resistance against metal, improvement of octane number, degree of bottom cracking, and so forth), not for obtaining gasoline and a gas oil fraction in high yields or attaining a high degree of bottom cracking and a low coke
5 yield.

Citation List

Patent Literature

[0006]

PTL 1: Japanese Unexamined Patent Application

10 Publication No. 2007-748

PTL 2: Japanese Unexamined Patent Application

Publication No. 2006-142273

~~Summary of Invention~~

Technical Problem

15 [0007]

However, known catalysts for fluid catalytic cracking have had a problem that none of available ones satisfies all of a high gasoline yield, a high yield of a gas oil fraction, a low coke yield, and a high degree of bottom cracking.

20 [0008]

Made under these circumstances, the present ~~invention~~disclosure aims to provide a catalyst for fluid catalytic cracking of hydrocarbon oil with which gasoline and a gas oil fraction can be obtained in high yields and a high degree of bottom

cracking and a low coke yield are attained, and a method for fluid catalytic cracking of hydrocarbon oil with it.

Solution to Problem

[0009]

5 More specifically, the gist of the present

invention disclosure is as follows:

10 In a first aspect, there is provided a catalyst for fluid catalytic cracking of hydrocarbon oil, comprising a catalyst composition A that comprises FAU type (faujasite type) zeolite and 10 to 30 % by mass of a silica-based binder as a binding agent and a catalyst composition B that comprises FAU type (faujasite type) zeolite and 10 to 30 % by mass of an aluminum-compound binder as a binding agent, mixed therein in any mass proportion in the range of 10:90 to 90:10 (W_A:W_B), provided that W_A is the mass of the catalyst composition A and W_B is the mass of the catalyst composition B.

15 [1] There is provided a catalyst for fluid catalytic cracking of hydrocarbon oil, comprising Catalyst Composition A that comprises zeolite and 10 to 30 % by mass of a silica-based binder as a binding agent and Catalyst Composition B that comprises zeolite and 10 to 30 % by mass of an aluminum-compound binder as a binding agent, mixed therein in any mass proportion in the range of 10:90 to 90:10 (W_A:W_B), provided

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that W_A is the mass of the catalyst composition A and W_B is the mass of the catalyst composition B.

[2] The catalyst for fluid catalytic cracking of hydrocarbon oil according to [1], wherein each of Catalyst Composition A and Catalyst Composition B has a K value as expressed by the following formula (1), which is equal to or higher than 1.

[0010]

$$K \text{ value} = \text{Conversion rate} / (100 - \text{Conversion rate}) \quad (1)$$

where the conversion rate is expressed by the following formula (2);

hydrogen Y-type zeolite (HY), ultrastable Y-type zeolite (USY), rare-earth exchanged Y-type zeolite (REY), and rare-earth exchanged ultrastable Y-type zeolite (REUSY).

[10] The catalyst for fluid catalytic cracking of hydrocarbon oil according to any of [1] to [9], wherein Catalyst Composition A and Catalyst Composition B further comprise, besides the zeolite and the binding agent, a clay mineral.

10 In a second aspect, there is provided a method for fluid catalytic cracking of hydrocarbon oil, with use of the above catalyst as defined above.

[11] There is provided a method for fluid catalytic cracking of hydrocarbon oil, with use of the above catalyst according to any of [1] to [10].

15 [12] The method for fluid catalytic cracking of hydrocarbon oil according to [11], wherein the hydrocarbon oil comprises a residual oil.

[13] The method for fluid catalytic cracking of hydrocarbon oil according to [12], wherein the hydrocarbon oil comprises vanadium and nickel being equal to or more than 20 0.5 ppm by mass for each.

[14] The method for fluid catalytic cracking of hydrocarbon oil according to any of [11] to [13], wherein the above catalyst comprises vanadium and nickel being equal to or more than 300 ppm by mass for each.

5 | ~~Advantageous Effects of Invention~~

[0013]

A catalyst for fluid catalytic cracking of hydrocarbon oil according to the present ~~invention~~disclosure comprises two catalyst compositions for cracking of different kinds of oil, more specifically, Catalyst Composition A comprising a silica-based binder and Catalyst Composition B comprising an aluminum-compound binder, mixed therein. This means that in fluid catalytic cracking of hydrocarbon oil, oil cracked by one of the catalyst compositions can be further cracked by the other catalyst composition, and thus oil left after cracking is lighter than ever; as a result, gasoline and a gas oil fraction can be obtained in high yields, coke is produced in a low yield, and the degree of bottom cracking can be high enough to prevent the formation of heavy cycle oil.

15 [0014]

In particular, when the raw material oil is heavy oil, which contains large amounts of vanadium, nickel, and other metals poisonous to catalysts, alumina contained in Catalyst Composition B, which comprises an alumina-compound binder, binds to these poisonous metals to detoxify them, and thus Catalyst Composition A, which comprises a silica-based binder, becomes unlikely to be poisoned by the poisoning metals; as a result, a high gasoline yield and a high yield of a gas oil fraction as well as a high degree of bottom cracking are