

Patent Document 5: JP 11-246868 A

Patent Document 6: JP 2004-130193 A

~~SUMMARY OF THE INVENTION~~

~~PROBLEMS TO BE SOLVED BY THE INVENTION~~

5 [0008]

However, although the catalyst for catalytic cracking obtained by: spray drying the aqueous slurry of the above mentioned mixture to form minute spherical particles; washing the minute spherical particles; and then by introducing a rare earth(s);
10 exhibits a high cracking activity and high gasoline selectivity, there are problems that an effort to increase the amount of rare earth(s) introduced to the catalyst in order to further improve its activity have failed to significantly increase the introduced amount of rare earth(s), and that the improvement in the cracking
15 activity, gasoline selectivity and the like is small, thereby resulting in a reduction in the utilization efficiency of valuable rare earths and in economic efficiency.

[0009]

In the catalyst disclosed in Patent Document 1, although
20 the metal resistance, activity, selectivity and the like of the catalyst are improved, the improvement in the activity and the selectivity is attributed to the improvement in the metal resistance, and the improvement in the gasoline yield, selectivity and the like is insufficient (possibly due to the rare earth(s))

coke, and which is excellent in hydrothermal resistance, by:
forming minute spherical particles by spray drying; thoroughly
washing the minute spherical particles; and introducing magnesium,
and then phosphorus to the minute spherical particles; thereby
5 | completing the present ~~invention~~disclosure.

[0015]

As a result, it is possible to provide a catalyst for
catalytic cracking which has a high cracking activity and high
gasoline selectivity, which generates a reduced amount of gas and
10 coke, and which is excellent in hydrothermal resistance and in
economic efficiency.

[1] A catalyst for catalytic cracking of hydrocarbons
comprising a faujasite-type zeolite, a matrix component, a
phosphorus component and a magnesium component,

15 wherein the content of the faujasite-type zeolite (C_Z) in
terms of solid is within the range of from 10 to 50 % by weight;
the content of phosphorus (C_P) in terms of P_2O_5 is within the range
of from 0.1 to 10 % by weight; and the content of magnesium (C_M)
in terms of MgO is within the range of from 0.05 to 3% by weight.

20 [2] The catalyst for catalytic cracking of hydrocarbons
according to item [1], wherein the ratio (C_P) / (C_M) of the content
of phosphorus (C_P) to the content of magnesium (C_M) is within the
range of from 0.1 to 8.

[3] The catalyst for catalytic cracking of hydrocarbons

[8] The method for producing a catalyst for catalytic cracking of hydrocarbons according to item [7], wherein the pH at the step (c) of ion exchange with magnesium ions is within the range of from 3 to 8.

5 [9] The method for producing a catalyst for catalytic cracking of hydrocarbons according to item [7] or [8], wherein the pH at the step (e) of contact with phosphate ions is within the range of from 2 to 6.

[10] The method for producing a catalyst for catalytic cracking of
10 hydrocarbons according to any one of items [7] to [9], wherein the following step (d) is carried out before or after carrying out the step (c):

(d) the step of performing ion exchange with rare earth ions.

[11] The method for producing a catalyst for catalytic cracking of
15 hydrocarbons according to item [10], wherein the pH at the step (d) of ion exchange with rare earth (RE) ions is within the range of from 4 to 6.

[12] The method for producing a catalyst for catalytic cracking of hydrocarbons according to any one of items [7] to [11], wherein the
20 following step (b) is carried out after the step (a):

(b) the step of performing washing.

[0015a]

In a first aspect, there is provided a method for producing a catalyst for catalytic cracking of hydrocarbons, comprising the following
25 steps (a), (c), (e) and (f):

(a) a step of spray drying a mixed slurry of a faujasite-type zeolite and a matrix-forming component in a hot air flow to form minute spherical particles;

(c) a step of subjecting the resultant to ion exchange with magnesium ions;

(e) a step of bringing the resultant into contact with phosphate ions; and

(f) a step of drying the resultant.

[0015b]

In another aspect, there is provided a catalyst for catalytic cracking of hydrocarbons obtained by the method as defined above, comprising a faujasite-type zeolite, a matrix component, a phosphorus component and a magnesium component,

wherein the content of the faujasite-type zeolite (C_z) in terms of solid is within the range of from 10 to 50 % by weight; the content of phosphorus (C_p) in terms of P_2O_5 is within the range of from 0.1 to 10 % by weight; and the content of magnesium (C_m) in terms of MgO is within the range of from 0.05 to 3% by weight.

EFFECT OF THE INVENTION

[0016]

According to the present ~~invention~~disclosure, it is possible to

CLAIMS

1. ~~A catalyst for catalytic cracking of hydrocarbons comprising a faujasite type zeolite, a matrix component, a phosphorus component and a magnesium component,~~

5 ~~wherein the content of the faujasite type zeolite (C_Z) in terms of solid is within the range of from 10 to 50 % by weight, the content of phosphorus (C_P) in terms of P_2O_5 is within the range of from 0.1 to 10 % by weight, and the content of magnesium (C_M) in terms of MgO is within the range of from 0.05 to 3% by weight.~~

10 2. ~~The catalyst for catalytic cracking of hydrocarbons according to claim 1, wherein the ratio (C_P) / (C_M) of said content of phosphorus (C_P) to said content of magnesium (C_M) is within the range of from 0.1 to 8.~~

15 3. ~~The catalyst for catalytic cracking of hydrocarbons according to claim 1 or 2, wherein the ratio (C_M) / (C_Z) of said content of magnesium (C_M) to said content of the faujasite type zeolite (C_Z) is within the range of from 0.001 to 0.1.~~

20 4. ~~The catalyst for catalytic cracking of hydrocarbons according to any one of claims 1 to 3, further comprising a rare earth, wherein the content of said rare earth in terms of RE_2O_3 is within the range of from 0.1 to 2% by weight.~~

~~5. The catalyst for catalytic cracking of hydrocarbons according to any one of claims 1 to 4, wherein said matrix component contains alumina, and wherein the content of alumina in terms of Al_2O_3 is within the range of from 1 to 30% by weight.~~

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~~6. The catalyst for catalytic cracking of hydrocarbons according to any one of claims 1 to 5, wherein said faujasite-type zeolite is an ultra-stable zeolite (USY).~~ CLAIMS

10 71. A method for producing a catalyst for catalytic cracking of hydrocarbons, comprising the following steps (a) ~~to~~, (c), (e) and (f):

(a) a step of spray drying a mixed slurry of a faujasite-type zeolite and a matrix-forming component in a hot air flow to form
15 minute spherical particles;

(c) a step of subjecting the resultant to ion exchange with magnesium ions;

(e) a step of bringing the resultant into contact with phosphate ions; and

20 (f) a step of drying the resultant.

82. The method for producing a catalyst for catalytic cracking of hydrocarbons according to claim 71, wherein the pH at the step (c) of ion exchange with magnesium ions is within the range of

from 3 to 8.

93. The method for producing a catalyst for catalytic cracking of hydrocarbons according to claim 71 or 82, wherein the pH at the step (e) of contact with phosphate ions is within the range of from 2 to 6.

104. The method for producing a catalyst for catalytic cracking of hydrocarbons according to any one of claims 71 to 93, wherein the following step (d) is carried out before or after carrying out said step (c):

(d) the step of performing ion exchange with rare earth ions.

115. The method for producing a catalyst for catalytic cracking of hydrocarbons according to claim 104, wherein the pH at the step (d) of ion exchange with rare earth (RE) ions is within the range of from 4 to 6.

126. The method for producing a catalyst for catalytic cracking of hydrocarbons according to any one of claims 71 to 115, wherein the following step (b) is carried out after said step (a):

(b) the step of performing washing.

7. A catalyst for catalytic cracking of hydrocarbons obtained by the method as claimed in any one of claims 1 to 6 comprising a faujasite-type zeolite, a matrix component, a phosphorus component and a magnesium component,

5 wherein the content of the faujasite-type zeolite (C_Z) in terms of solid is within the range of from 10 to 50 % by weight; the content of phosphorus (C_P) in terms of P_2O_5 is within the range of from 0.1 to 10 % by weight; and the content of magnesium (C_M) in terms of MgO is within the range of from 0.05 to 3% by weight.

10 8. The catalyst for catalytic cracking of hydrocarbons according to claim 7, wherein the ratio (C_P) / (C_M) of said content of phosphorus (C_P) to said content of magnesium (C_M) is within the range of from 0.1 to 8.

15 9. The catalyst for catalytic cracking of hydrocarbons according to claim 7 or 8, wherein the ratio (C_M) / (C_Z) of said content of magnesium (C_M) to said content of the faujasite-type zeolite (C_Z) is within the range of from 0.001 to 0.1.

20 10. The catalyst for catalytic cracking of hydrocarbons according to any one of claims 7 to 9, further comprising a rare earth, wherein the content of said rare earth in terms of RE_2O_3 is within the range of from 0.1 to 2% by weight.

11. The catalyst for catalytic cracking of hydrocarbons according to any one of claims 7 to 10, wherein said matrix component contains alumina, and wherein the content of alumina in terms of Al_2O_3 is within the range of from 1 to 30% by weight.

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12. The catalyst for catalytic cracking of hydrocarbons according to any one of claims 7 to 11, wherein said faujasite-type zeolite is an ultra-stable zeolite (USY).