Claims

1. A catalytic cracking catalyst, wherein the catalytic cracking catalyst contains a cracking active component comprising a Y zeolite, a high specific heat capacity matrix material, a clay and a binder; the high specific heat capacity matrix material contains 5-95wt% of alumina as Al_2O_3, 5-95 wt% of manganese oxide as MnO_2 and 0-40wt% of a boron compound on the dry basis, the high specific heat capacity matrix material has a specific heat capacity of 1.3-2.0 J/(g•K) at a temperature of 1000K, wherein preferably, based on the total weight of the catalytic cracking catalyst, the catalytic cracking catalyst contains 1-60 wt% of the cracking active component, 1-50 wt% of the high specific heat capacity matrix material, 1-70 wt% of the clay and 1-70 wt% of the binder, or, based on the total weight of the catalytic cracking catalyst, the catalytic cracking catalyst contains 10-50 wt% of the cracking active component, 5-40 wt% of the high specific heat capacity matrix material, 10-60 wt% of the clay and 10-60 wt% of the binder.

2. The catalytic cracking catalyst as claimed in any of the precedent claims, wherein the boron compound is boron nitride and/or boron oxide.

3. The catalytic cracking catalyst as claimed in any of the precedent claims, wherein the high specific heat capacity matrix material has a specific surface area of 150-500 m^2/g; and/or, the high specific heat capacity matrix material has a pore volume of 0.3-1.5 cm^3/g; and/or, the high specific heat capacity matrix material has an average pore diameter of 3-20 nm.

4. The catalytic cracking catalyst as claimed in any of the precedent claims, wherein in the XRD spectrum of the high specific heat capacity matrix material, the ratio of the intensity of the peak at 2θ angle of 18±0.5° to the intensity of the peak at 2θ angle of 37±0.5° is 1:(3-10).

5. The catalytic cracking catalyst as claimed in any of the precedent claims, wherein the high specific heat capacity matrix material is prepared by a method comprising the steps:

(1) mixing an aluminium source and an alkali to form a colloid to obtain an aluminium-containing colloid, the pH value of the obtained aluminium-containing colloid is 7-11;

(2) mixing a manganese salt solution with a pH value of 3-7 and urea to obtain a manganese source solution;

(3) forming a mixture of the aluminium-containing colloid, the manganese source solution, and optionally the boron compound; and optionally

(4) washing and/or drying and/or calcining.

6. The catalytic cracking catalyst as claimed in claim 5, wherein in step (1),

mixing the aluminium source and the alkali to form a colloid includes: mixing a solution of the aluminium source and a solution of the alkali to form a colloid with a temperature ranging from room temperature to 85°C and a pH value of 7-11; and/or,

the concentration of alumina in the solution of the aluminium source is 150-350g Al_2O_3/L, the concentration of the alkali in the solution of the alkali is 0.1-1 mol/L; and/or,

the aluminium source is one or more of aluminium nitrate, aluminium sulfate, aluminium

phosphate, aluminium chloride and the like; the alkali is one or more of a water-soluble carbonate, a water-soluble bicarbonate, and a water-soluble hydroxide; wherein, preferably, the solution of the alkali is an alkaline aqueous solution containing one or more of CO_3^{2-}, HCO_3- and OH^-; in the solution of the alkali, the concentration of CO_3^{2-} is 0-0.6 mol/L, the concentration of OH^- is 0-0.5 mol/L, and the concentration of HCO_3- is 0-1 mol/L.

7. The catalytic cracking catalyst as claimed in any of claims 5-6, wherein in step (2), the molar ratio of urea to manganese ions is 1-5, for example 2-4, and the concentration of the manganese salt as MnO_2 in the manganese salt solution may be 50-500 g/L.

8. The catalytic cracking catalyst as claimed in any of claims 5-7, wherein in step (2), urea is added to the manganese salt solution, and then the resulting mixture is stirred at room temperature for 30-60 minutes to obtain a manganese source solution.

9. The catalytic cracking catalyst as claimed in any of claims 5-8, wherein the boron compound is boron nitride and/or boron oxide and/or a boron oxide precursor, wherein, preferably, the boron nitride is one or more of hexagonal boron nitride, cubic boron nitride, rhombohedral boron nitride and wurtzite boron nitride; the boron oxide precursor is one or more of ammonium borate, ammonium biborate and boric acid.

10. The catalytic cracking catalyst as claimed in any of claims 5-9, wherein in step (3), after mixing the aluminium-containing colloid and the manganese source solution, an aging process is further included; the aging temperature is from room temperature to 120°C, the aging time is 4-72 hours, and the aging is carried out under stirring or under standing alone; preferably, the aging is carried out under stirring, the aging temperature is 60-100°C, and the aging time is 12-36 hours.

11. The catalytic cracking catalyst as claimed in any of claims 5-9, wherein the boron compound is boron nitride; the process of forming a mixture of the aluminium-containing colloid, the manganese source solution, and the boron compound in step (3) is as follows: mixing the aluminium-containing colloid, the manganese source solution, and the boron compound, and aging; or

the boron compound is boron oxide and/or a precursor of boron oxide; the process of forming a mixture of the aluminium-containing colloid, the manganese source solution, and the boron compound in step (3) is as follows: mixing the aluminium-containing colloid and the manganese source solution, aging, optionally washing, and then mixing with the boron compound.

12. The catalytic cracking catalyst as claimed in any of claims 5-9, wherein in step (4) the calcining temperature is 500°C-900°C, and the calcining time is 4-8 hours.

13. The catalytic cracking catalyst as claimed in any of claims 1-4, wherein the cracking active component contains a Y zeolite, and optionally the cracking active component further contains a second molecular sieve, the second molecular sieve is one or more of faujasite, beta zeolite, MFI-structured molecular sieve and mordenite;

wherein preferably based on the total weight of the cracking active components, the content of the Y zeolite is 75 wt% or more, and the content of the second molecular sieve is 25 wt%

or less.

14. A method for preparing the catalytic cracking catalyst as claimed in any of claims 1-13, wherein the method comprises a cracking active component, a high specific heat capacity matrix material, a clay and a binder are mixed and stirred with water, and then the resulting mixture is successively spray-dried, calcined, washed, filtered and dried.

15. Use of the catalytic cracking catalyst as claimed in any of claims 1-13 in the heavy oil catalytic cracking.