CLAIMS

1. A hydrotreating catalyst, which is in a particulate form, and comprises a porous refractory carrier (preferably one or more selected from the group consisting of porous refractory oxides, more preferably one or more selected from the group consisting of porous inorganic refractory oxides, more preferably one or more selected from the group consisting of oxides of a Group II, Group III or Group IV element in the element periodic table, more preferably one or more selected from the group consisting of silica, alumina, magnesia, silica-alumina, silica-magnesia and alumina-magnesia, further preferably alumina) and an active metal component A, an active metal component B, an active metal component C and optionally an auxiliary component supported on the porous refractory carrier, the active metal component A is Ni, the active metal component B is one or more selected from the group consisting of Group VIII metals other than Ni in the element periodic table, preferably one or more selected from the group consisting of Group VIII non-noble metals other than Ni in the element periodic table, more preferably Co, the active metal component C is one or more selected from the group consisting of Group VIB metals in the element periodic table, preferably one or more selected from the group consisting of Mo and W, more preferably Mo, the auxiliary component is one or more selected from the group consisting of fluorine, silicon, phosphorus, titanium, zirconium and boron, preferably one or more selected from the group consisting of fluorine and phosphorus, more preferably phosphorus,

wherein,

the concentration distribution of the active metal component A meets the following condition (I) or (II),

Condition (I): throughout the cross-section of each individual catalyst particle, the concentration thereof substantially uniformly distributes,

Condition (II): throughout the cross-section of each individual catalyst particle, the concentration thereof meets the following formulas (1)

and (2) at the same time:

Formula (1): $C^A_{out}>C^A_{1/2}>1$, preferably $C^A_{out}>C^A_{1/4}>C^A_{1/2}>C^A_{3/4}>1$, more preferably $C^A_{out}>C^A_{opt}>1$, more preferably C^A_{out} / $C^A_{1/2}$=1.5-2.6, preferably 1.7-2.5, further preferably C^A_{out} / $C^A_{1/4}$=1.2-1.8, preferably 1.3-1.7, further preferably $C^A_{1/4}$ / $C^A_{1/2}$=1.1-1.7, preferably 1.2-1.6,

Formula (2): $C^A_{out}\geq 1.5$, preferably $C^A_{out}\geq 2.0$, more preferably $C^A_{out}\geq 2.4$, but $C^A_{out}\leq 5.0$, preferably $C^A_{out}\leq 4.0$,

wherein the symbol C^A_{out} represents the ratio of the concentration of the active metal component A at an arbitrary position point P_A on the outmost edge of the cross-section of the catalyst particle to the concentration of the active metal component A at the central point on the cross-section of the catalyst particle, and assuming that the length value of the line segment connecting the central point and the position point P_A on the cross-section of the catalyst particle is L_A, the symbol $C^A_{1/2}$ represents the ratio of the concentration of the active metal component A at the position point on the line segment (1/2)L_A away from the position point P_A to the concentration of the active metal component A at the central point on the cross-section of the catalyst particle, the symbol $C^A_{1/4}$ represents the ratio of the concentration of the active metal component A at the position point on the line segment (1/4)L_A away from the position point P_A to the concentration of the active metal component A at the central point on the cross-section of the catalyst particle, the symbol $C^A_{3/4}$ represents the ratio of the concentration of the active metal component A at the position point on the line segment (3/4)L_A away from the position point P_A to the concentration of the active metal component A at the central point on the cross-section of the catalyst particle, the symbol C^A_{opt} represents the ratio of the concentration of the active metal component A at an arbitrary position point on the line segment (not including the central point and the position point P_A) to the concentration of the active metal component A at the central point on the cross-section of the catalyst particle,

and, the concentration distribution of the active metal component B meets the following condition (III) or (IV),

Condition (III): throughout the cross-section of each individual catalyst particle, the concentration thereof substantially uniformly distributes.

Condition (IV): throughout the cross-section of each individual catalyst particle, the concentration thereof meets the following formulas (3) and (4) at the same time:

Formula (3): $C^B_{out}<C^B_{1/2}<1$, preferably $C^B_{out}<C^B_{1/4}<C^B_{1/2}<C^B_{3/4}<1$, more preferably $C^B_{out}<C^B_{opt}<1$, more preferably C^B_{out} / $C^B_{1/2}$=0.2-0.8, preferably 0.2-0.7, further preferably C^B_{out} / $C^B_{1/4}$=0.3-0.9, preferably 0.3-0.85, further preferably $C^B_{1/4}$ / $C^B_{1/2}$=0.4-0.9, preferably 0.4-0.87,

Formula (4): $C^B_{out}\leq 0.80$, preferably $C^B_{out}\leq 0.70$, preferably $C^B_{out}\leq 0.68$, preferably $C^B_{out}\leq 0.60$, but $C^B_{out}\geq 0.10$, preferably $C^B_{out}\geq 0.20$,

wherein the symbol C^B_{out} represents the ratio of the concentration of the active metal component B at an arbitrary position point P_B on the outmost edge of the cross-section of the catalyst particle to the concentration of the active metal component B at the central point on the cross-section of the catalyst particle, and assuming that the length value of the line segment connecting the central point and the position point P_B on the cross-section of the catalyst particle is L_B, the symbol $C^B_{1/2}$ represents the ratio of the concentration of the active metal component B at the position point on the line segment (1/2)L_B away from the position point P_B to the concentration of the active metal component B at the central point on the cross-section of the catalyst particle, the symbol $C^B_{1/4}$ represents the ratio of the concentration of the active metal component B at the position point on the line segment (1/4)L_B away from the position point P_B to the concentration of the active metal component B at the central point on the cross-section of the catalyst particle, the symbol $C^B_{3/4}$ represents the ratio of the concentration of the active metal component B at the position point on the line segment (3/4)L_B away from the position point P_B to the concentration of the active metal component B at the central point on the cross-section of the catalyst particle, the symbol C^B_{opt} represents the ratio of the concentration of the active metal component B at an arbitrary

position point on the line segment (not including the central point and the position point P_B) to the concentration of the active metal component B at the central point on the cross-section of the catalyst particle,

with the proviso that, the concentration distribution of the active metal component A and the concentration distribution of the active metal component B do not meet the conditions (I) and (III) at the same time,

preferably, the concentration distribution of the active metal component A meets the condition (II), and at the same time, the concentration distribution of the active metal component B meets the condition (IV).

2. The hydrotreating catalyst according to Claim 1, having a specific surface area (by the BET method) of 100-260 m^2 / g, preferably 120-220 m^2 / g, and a pore volume (by the BET method) of 0.20-0.60ml / g, preferably 0.20-0.50ml / g.

3. The hydrotreating catalyst according to Claim 1, wherein the content of the porous refractory carrier is 45-89wt%, 46-87wt% or 55-85wt%, preferably the remaining; the content of the active metal component A (as NiO) is 1-8wt%; the content of the active metal component B (as the corresponding oxide, for example, Co as CoO) is at least 0.5wt%, 1wt% or 1.5wt%, at most 6wt% or 8wt%; the content of the active metal component C (as the corresponding oxide) is 6-60wt%, preferably 6-40wt%, especially the content of Mo (as MoO3) is at least 6wt%, 8wt% or 10wt%, at most 26wt%, 32wt% or 40wt%, and / or, the content of W (as WO_3) is 6-28wt%; and the content of the auxiliary component (as the corresponding element) is 30wt% or less, preferably 20wt% or less, especially the content of phosphorus (as P_2O_5) is 1-6wt%, relative to the weight of the catalyst.

4. The hydrotreating catalyst according to Claim 1, wherein the active metal component C is Mo, and the concentration distribution of Mo meets the following condition (V) or (VI),

Condition (V): throughout the cross-section of each individual catalyst particle, the concentration thereof substantially uniformly

distributes,

Condition (VI): throughout the cross-section of each individual catalyst particle, the concentration thereof meets the following formulas (5) and (6) at the same time:

Formula (5): $C^{Mo}_{out}<C^{Mo}_{1/2}<1$, preferably $C^{Mo}_{out}<C^{Mo}_{1/4}<C^{Mo}_{1/2}<C^{Mo}_{3/4}<1$, more preferably $C^{Mo}_{out}<C^{Mo}_{opt}<1$,

Formula (6): $0.08\leq C^{Mo}_{out}\leq 0.70$,

wherein the symbol C^{Mo}_{out} represents the ratio of the concentration of the active metal component Mo at an arbitrary position point P_{Mo} on the outmost edge of the cross-section of the catalyst particle to the concentration of the active metal component Mo at the central point on the cross-section of the catalyst particle, and assuming that the length value of the line segment connecting the central point and the position point P_{Mo} on the cross-section of the catalyst particle is L_{Mo}, the symbol $C^{Mo}_{1/2}$ represents the ratio of the concentration of the active metal component Mo at the position point on the line segment $(1/2)L_{Mo}$ away from the position point P_{Mo} to the concentration of the active metal component Mo at the central point on the cross-section of the catalyst particle, the symbol $C^{Mo}_{1/4}$ represents the ratio of the concentration of the active metal component Mo at the position point on the line segment $(1/4)L_{Mo}$ away from the position point P_{Mo} to the concentration of the active metal component Mo at the central point on the cross-section of the catalyst particle, the symbol $C^{Mo}_{3/4}$ represents the ratio of the concentration of the active metal component Mo at the position point on the line segment $(3/4)L_{Mo}$ away from the position point P_{Mo} to the concentration of the active metal component Mo at the central point on the cross-section of the catalyst particle, the symbol C^{Mo}_{opt} represents the ratio of the concentration of the active metal component Mo at an arbitrary position point on the line segment (not including the central point and the position point P_{Mo}) to the concentration of the active metal component Mo at the central point on the cross-section of the catalyst particle,

or,

the active metal component C is a combination of Mo and W, the concentration distribution of Mo meets the following condition (V) or (VI), while the concentration distribution of W meets the following condition (VII) or (VIII),

Condition (V): throughout the cross-section of each individual catalyst particle, the concentration thereof substantially uniformly distributes,

Condition (VI): throughout the cross-section of each individual catalyst particle, the concentration thereof meets the following formulas (5) and (6) at the same time:

Formula (5): $C^{Mo}_{out}<C^{Mo}_{1/2}<1$, preferably $C^{Mo}_{out}<C^{Mo}_{1/4}<C^{Mo}_{1/2}<C^{Mo}_{3/4}<1$, more preferably $C^{Mo}_{out}<C^{Mo}_{opt}<1$,

Formula (6): $0.08\leq C^{Mo}_{out}\leq 0.70$,

wherein the symbol C^{Mo}_{out} represents the ratio of the concentration of the active metal component Mo at an arbitrary position point P_{Mo} on the outmost edge of the cross-section of the catalyst particle to the concentration of the active metal component Mo at the central point on the cross-section of the catalyst particle, and assuming that the length value of the line segment connecting the central point and the position point P_{Mo} on the cross-section of the catalyst particle is L_{Mo}, the symbol $C^{Mo}_{1/2}$ represents the ratio of the concentration of the active metal component Mo at the position point on the line segment $(1/2)L_{Mo}$ away from the position point P_{Mo} to the concentration of the active metal component Mo at the central point on the cross-section of the catalyst particle, the symbol $C^{Mo}_{1/4}$ represents the ratio of the concentration of the active metal component Mo at the position point on the line segment $(1/4)L_{Mo}$ away from the position point P_{Mo} to the concentration of the active metal component Mo at the central point on the cross-section of the catalyst particle, the symbol $C^{Mo}_{3/4}$ represents the ratio of the concentration of the active metal component Mo at the position point on the line segment $(3/4)L_{Mo}$ away from the position point P_{Mo} to the concentration of the active metal component Mo at the central point on the cross-section of the catalyst particle, the symbol C^{Mo}_{opt}

represents the ratio of the concentration of the active metal component Mo at an arbitrary position point on the line segment (not including the central point and the position point P_{Mo}) to the concentration of the active metal component Mo at the central point on the cross-section of the catalyst particle,

Condition (VII): throughout the cross-section of each individual catalyst particle, the concentration thereof substantially uniformly distributes,

Condition (VIII): throughout the cross-section of each individual catalyst particle, the concentration thereof meets the following formulas (7) and (8) at the same time:

Formula (7): $C^{W}_{out}>C^{W}_{1/2}>1$, preferably $C^{W}_{out}>C^{W}_{1/4}>C^{W}_{1/2}>C^{W}_{3/4}>1$, more preferably $C^{W}_{out}>C^{W}_{opt}>1$,

Formula (8): $7.0\geq C^{W}_{out}\geq 1.2$,

wherein the symbol C^{W}_{out} represents the ratio of the concentration of the active metal component W at an arbitrary position point P_W on the outmost edge of the cross-section of the catalyst particle to the concentration of the active metal component W at the central point on the cross-section of the catalyst particle, and assuming that the length value of the line segment connecting the central point and the position point P_W on the cross-section of the catalyst particle is L_W, the symbol $C^{W}_{1/2}$ represents the ratio of the concentration of the active metal component W at the position point on the line segment $(1/2)L_W$ away from the position point P_W to the concentration of the active metal component W at the central point on the cross-section of the catalyst particle, the symbol $C^{W}_{1/4}$ represents the ratio of the concentration of the active metal component W at the position point on the line segment $(1/4)L_W$ away from the position point P_W to the concentration of the active metal component W at the central point on the cross-section of the catalyst particle, the symbol $C^{W}_{3/4}$ represents the ratio of the concentration of the active metal component W at the position point on the line segment $(3/4)L_W$ away from the position point P_W to the concentration of the active metal component W at the

central point on the cross-section of the catalyst particle, the symbol C^{W}_{opt} represents the ratio of the concentration of the active metal component W at an arbitrary position point on the line segment (not including the central point and the position point P_W) to the concentration of the active metal component W at the central point on the cross-section of the catalyst particle.

5. The hydrotreating catalyst according to Claim 1, wherein according to the formula (1), on the cross-section of each individual catalyst particle, the concentration of the active metal component A along the line segment from the position point P_A to the central point substantially gradually decreases, it is preferable to meet the formula (1'), with the proviso that when the calculated value of the relation $(d2_A-d1_A) / L_A$ is 5% or less (preferably 2% or less, more preferably 1% or less, more preferably 0.5% or less), $C^{A}_{opt-1}>90\%C^{A}_{opt-2}$ (preferably $C^{A}_{opt-1}>95\%C^{A}_{opt-2}$, more preferably $C^{A}_{opt-1}>98\%C^{A}_{opt-2}$) holds, it is more preferably that the formula (1) is the following formula (1'),

Formula (1'): $C^{A}_{out}>C^{A}_{opt-1}>C^{A}_{opt-2}>1$,

wherein the symbol C^{A}_{opt-1} represents the ratio of the concentration of the active metal component A at an arbitrary position point opt-1 on the line segment (not including the position point P_A and the central point) to the concentration of the active metal component A at the central point on the cross-section of the catalyst particle, the symbol C^{A}_{opt-2} represents the ratio of the concentration of the active metal component A at an arbitrary position point opt-2 on the line segment (not including the position point P_A and the central point) to the concentration of the active metal component A at the central point on the cross-section of the catalyst particle, and assuming that the linear distance between the position point P_A and the position point opt-1 is $d1_A$ in value, while the linear distance between the position point P_A and the position point opt-2 is $d2_A$ in value, then $d1_A / d2_A<1$,

or,

according to the formula (3), on the cross-section of each individual

catalyst particle, the concentration of the active metal component B along the line segment from the position point P_B to the central point substantially gradually increases, it is preferable to meet the formula (3'), with the proviso that when the calculated value of the relation $(d2_B\text{-}d1_B) / L_B$ is 5% or less (preferably 2% or less, more preferably 1% or less, more preferably 0.5% or less), $C^B_{opt\text{-}1}<110\%C^B_{opt\text{-}2}$ (preferably $C^B_{opt\text{-}1}<105\%C^B_{opt\text{-}2}$, more preferably $C^B_{opt\text{-}1}<102\%C^B_{opt\text{-}2}$) holds, it is more preferably that the formula (3) is the following formula (3'),

Formula (3'): $C^B_{out}<C^B_{opt\text{-}1}<C^B_{opt\text{-}2}<1$,

wherein the symbol $C^B_{opt\text{-}1}$ represents the ratio of the concentration of the active metal component B at an arbitrary position point opt-1 on the line segment (not including the position point P_B and the central point) to the concentration of the active metal component B at the central point on the cross-section of the catalyst particle, the symbol $C^B_{opt\text{-}2}$ represents the ratio of the concentration of the active metal component B at an arbitrary position point opt-2 on the line segment (not including the position point P_B and the central point) to the concentration of the active metal component B at the central point on the cross-section of the catalyst particle, and assuming that the linear distance between the position point P_B and the position point opt-1 is $d1_B$ in value, while the linear distance between the position point P_B and the position point opt-2 is $d2_B$ in value, then $d1_B / d2_B<1$.

6. The hydrotreating catalyst according to Claim 1, wherein on the outmost surface of the catalyst particle, the ratio of the concentration of the active metal component A to the concentration of the active metal component C (preferably the ratio of the concentration of Ni to the concentration of Mo, the ratio of the concentration of Ni to the concentration of W or the ratio of the concentration of Ni to the concentration of (W+Mo)) is 0.22-0.80, preferably 0.30-0.70, and / or, at the central point of the catalyst particle, the ratio of the concentration of the active metal component B to the concentration of the active metal component C (preferably the ratio of the concentration of Co to the

concentration of Mo) is 0.20-0.78, preferably 0.25-0.65.

~~7. A process for producing a hydrotreating catalyst, comprising at least the following steps:~~

~~(1-1) By unsaturated impregnation, onto a particulate porous refractory carrier (preferably one or more selected from the group consisting of porous refractory oxides, more preferably one or more selected from the group consisting of porous inorganic refractory oxides, more preferably one or more selected from the group consisting of oxides of a Group II, Group III or Group IV element in the element periodic table, more preferably one or more selected from the group consisting of silica, alumina, magnesia, silica-alumina, silica-magnesia and alumina-magnesia, further preferably alumina), an adsorbent I is supported, and optionally an organic alcohol having a carbon atom number of 1-5 (especially a monohydric alcohol or polyol, preferably one or more selected from the group consisting of ethylene glycol, propylene glycol, glycerin, pentaerythritol and xylitol) is simultaneously supported, wherein the adsorbent I is one or more selected from the group consisting of an organic carboxylic acid (especially a monohydric or polyhydric carboxylic acid, preferably a dihydric carboxylic acid) having a carbon atom number of 2-15 and an ammonium salt thereof, preferably one or more selected from the group consisting of acetic acid, oxalic acid, lactic acid, malonic acid, tartaric acid, malic acid, citric acid, trichloroacetic acid, monochloroacetic acid, mercaptoacetic acid, mercaptopropionic acid, ethylenediamine tetraacetic acid, nitrilotriacetic acid, diaminocyclohexane tetraacetic acid and ammonium salts thereof, the adsorbent I is used with an amount of 0.1-10wt% relative to the amount of the porous refractory carrier, the organic alcohol is used with an amount of 0.1-10wt% relative to the amount of the porous refractory carrier;~~

~~(1-2) Onto the product obtained from the step (1-1), an active metal component B, optionally an active metal component C and optionally an auxiliary component are supported, wherein the active metal component B is one or more selected from the group consisting of Group VIII metals~~

~~other than Ni in the element periodic table, preferably Co, the active metal component C is one or more selected from the group consisting of Group VIB metals in the element periodic table, preferably one or more selected from the group consisting of Mo and W, more preferably Mo, the auxiliary component is one or more selected from the group consisting of fluorine, silicon, phosphorus, titanium, zirconium and boron, preferably one or more selected from the group consisting of fluorine and phosphorus, more preferably phosphorus, and~~

~~(1-3) Before the beginning of the step (1-1) and / or after the completion of the step (1-2), onto the porous refractory carrier, an active metal component A, optionally the active metal component C and optionally the auxiliary component are supported, wherein the active metal component A is Ni,~~

~~with the proviso that the active metal component C is supported through at least one out of the step (1-2) and the step (1-3) (preferably through a combination of the step (1-2) and the step (1-3)),~~

~~or,~~

~~comprising at least the following steps:~~

~~(2-1) By saturated impregnation or oversaturated impregnation, onto a particulate porous refractory carrier (preferably one or more selected from the group consisting of porous refractory oxides, more preferably one or more selected from the group consisting of porous inorganic refractory oxides, more preferably one or more selected from the group consisting of oxides of a Group II, Group III or Group IV element in the element periodic table, more preferably one or more selected from the group consisting of silica, alumina, magnesia, silica-alumina, silica-magnesia and alumina-magnesia, further preferably alumina), an adsorbent II is supported, wherein the adsorbent II is a polyol having a number averaged molecular weight Mn (by the GPC method) of 400-10000, preferably a polyol having a number averaged molecular weight Mn (by the GPC method) of 1000-8000, more preferably polyether glycol (especially polyethylene glycol) having a number averaged molecular weight Mn (by~~

the GPC method) of 1000-8000, the adsorbent II is used with an amount of 0.1-10wt% relative to the amount of the porous refractory carrier;

(2-2) Onto the product obtained from the step (2-1), an active metal component A, optionally an active metal component C and optionally an auxiliary component are supported, wherein the active metal component A is Ni, the active metal component C is one or more selected from the group consisting of Group VIB metals in the element periodic table, preferably one or more selected from the group consisting of Mo and W, more preferably Mo, the auxiliary component is one or more selected from the group consisting of fluorine, silicon, phosphorus, titanium, zirconium and boron, preferably one or more selected from the group consisting of fluorine and phosphorus, more preferably phosphorus, and

(2-3) Before the beginning of the step (2-1) and / or after the completion of the step (2-2), onto the porous refractory carrier, an active metal component B, optionally the active metal component C and optionally the auxiliary component are supported, wherein the active metal component B is one or more selected from the group consisting of Group VIII metals other than Ni in the element periodic table, preferably Co,

with the proviso that the active metal component C is supported through at least one out of the step (2-2) and the step (2-3) (preferably through a combination of the step (2-2) and the step (2-3)),

or,

comprising at least the following steps:

(3-1) By unsaturated impregnation, onto a particulate porous refractory carrier (preferably one or more selected from the group consisting of porous refractory oxides, more preferably one or more selected from the group consisting of porous inorganic refractory oxides, more preferably one or more selected from the group consisting of oxides of a Group II, Group III or Group IV element in the element periodic table, more preferably one or more selected from the group consisting of silica, alumina, magnesia, silica-alumina, silica-magnesia and alumina-magnesia, further preferably alumina), an adsorbent I is supported, and optionally an

~~organic alcohol having a carbon atom number of 1-5 (especially a monohydric alcohol or polyol, preferably one or more selected from the group consisting of ethylene glycol, propylene glycol, glycerin, pentaerythritol and xylitol) is simultaneously supported, wherein the adsorbent I is one or more selected from the group consisting of organic carboxylic acids having a carbon atom number of 2-15 (especially monohydric or polyhydric carboxylic acids, preferably dihydric carboxylic acids) and ammonium salts thereof, preferably one or more selected from the group consisting of acetic acid, oxalic acid, lactic acid, malonic acid, tartaric acid, malic acid, citric acid, trichloroacetic acid, monochloroacetic acid, mercaptoacetic acid, mercaptopropionic acid, ethylenediamine tetraacetic acid, nitrilotriacetic acid, diaminocyclohexane tetraacetic acid and ammonium salts thereof, the adsorbent I is used with an amount of 0.1-10wt% relative to the amount of the porous refractory carrier, the organic alcohol is used with an amount of 0.1-10wt% relative to the amount of the porous refractory carrier,~~

~~(3-2) Onto the product obtained from the step (3-1), an active metal component B, optionally an active metal component C and optionally an auxiliary component are supported, wherein the active metal component B is one or more selected from the group consisting of Group VIII metals other than Ni in the element periodic table, preferably Co, the active metal component C is one or more selected from the group consisting of Group VIB metals in the element periodic table, preferably one or more selected from the group consisting of Mo and W, more preferably Mo, the auxiliary component is one or more selected from the group consisting of fluorine, silicon, phosphorus, titanium, zirconium and boron, preferably one or more selected from the group consisting of fluorine and phosphorus, more preferably phosphorus,~~

~~(3-3) By saturated impregnation or oversaturated impregnation, onto the product obtained from the step (3-2), an adsorbent II is supported, wherein the adsorbent II is a polyol having a number-averaged molecular weight Mn (by the GPC method) of 400-10000, preferably a polyol having~~

~~a number averaged molecular weight Mn (by the GPC method) of 1000-8000, more preferably polyether glycol (especially polyethylene glycol) having a number averaged molecular weight Mn (by the GPC method) of 1000-8000, the adsorbent II is used with an amount of 0.1-10wt% relative to the amount of the porous refractory carrier;~~

~~(3-4) Onto the product obtained from the step (3-3), an active metal component A, optionally the active metal component C and optionally the auxiliary component are supported, wherein the active metal component A is Ni, and~~

~~(3-5) Optionally before the beginning of the step (3-1), after the completion of the step (3-2), while before the beginning of the step (3-3) and / or after the completion of the step (3-4), onto the porous refractory carrier, the active metal component C and optionally the auxiliary component are supported,~~

~~with the proviso that the active metal component C is supported through at least one out of the step (3-2), the step (3-4) and the step (3-5) (preferably through a combination of the step (3-2) and the step (3-4)),~~

~~or,~~

~~comprising at least the following steps:~~

~~(4-1) By saturated impregnation or oversaturated impregnation, onto a particulate porous refractory carrier (preferably one or more selected from the group consisting of porous refractory oxides, more preferably one or more selected from the group consisting of porous inorganic refractory oxides, more preferably one or more selected from the group consisting of oxides of a Group II, Group III or Group IV element in the element periodic table, more preferably one or more selected from the group consisting of silica, alumina, magnesia, silica-alumina, silica-magnesia and alumina-magnesia, further preferably alumina), an adsorbent II is supported, wherein the adsorbent II is a polyol having a number averaged molecular weight Mn (by the GPC method) of 400-10000, preferably a polyol having a number averaged molecular weight Mn (by the GPC method) of 1000-8000, more preferably polyether glycol (especially~~

~~polyethylene glycol) having a number averaged molecular weight Mn (by the GPC method) of 1000-8000, wherein the adsorbent II is used with an amount of 0.1-10wt% relative to the amount of the porous refractory carrier;~~

~~(4-2) Onto the product obtained from the step (4-1), an active metal component A, optionally an active metal component C and optionally an auxiliary component are supported, wherein the active metal component A is Ni, the active metal component C is one or more selected from the group consisting of Group VIB metals in the element periodic table, preferably one or more selected from the group consisting of Mo and W, more preferably Mo, the auxiliary component is one or more selected from the group consisting of fluorine, silicon, phosphorus, titanium, zirconium and boron, preferably one or more selected from the group consisting of fluorine and phosphorus, more preferably phosphorus;~~

~~(4-3) By unsaturated impregnation, onto the product obtained from the step (4-2), an adsorbent I is supported, and optionally an organic alcohol having a carbon atom number of 1-5 (especially a monohydric alcohol or polyol, preferably one or more selected from the group consisting of ethylene glycol, propylene glycol, glycerin, pentaerythritol and xylitol) is simultaneously supported, wherein the adsorbent I is one or more selected from the group consisting of organic carboxylic acids (especially monohydric or polyhydric carboxylic acids, preferably dihydric carboxylic acids) having a carbon atom number of 2-15 and ammonium salts thereof, preferably one or more selected from the group consisting of acetic acid, oxalic acid, lactic acid, malonic acid, tartaric acid, malic acid, citric acid, trichloroacetic acid, monochloroacetic acid, mercaptoacetic acid, mercaptopropionic acid, ethylenediamine tetraacetic acid, nitrilotriacetic acid, diaminocyclohexane tetraacetic acid and ammonium salts thereof, the adsorbent I is used with an amount of 0.1-10wt% relative to the amount of the porous refractory carrier, the organic alcohol is used with an amount of 0.1-10wt% relative to the amount of the porous refractory carrier;~~

(4-4) Onto the product obtained from the step (4-3), an active metal component B, optionally the active metal component C and optionally the auxiliary component are supported, wherein the active metal component B is one or more selected from the group consisting of Group VIII metals other than Ni in the element periodic table, preferably Co, and

(4-5) Optionally before the beginning of the step (4-1), after the completion of the step (4-2), while before the beginning of the step (4-3) and / or after the completion of the step (4-4), onto the porous refractory carrier, the active metal component C and optionally the auxiliary component are supported,

with the proviso that the active metal component C is supported through at least one out of the step (4-2), the step (4-4) and the step (4-5) (preferably through a combination of the step (4-2) and the step (4-4)).

8. The process according to Claim 7, further comprising at least one out of the following steps:

(I) After the completion of the step (1-1) while before the beginning of the step (1-2), the obtained product is aged for 0.5-8h (preferably 0.5-6h) or not aged, and then / or at a temperature of 60-250 degrees Celsius (preferably 100-200 degrees Celsius) dried for 0.5-20h (preferably 1-6h);

(II) After the completion of the step (1-2) while before the beginning of the step (1-3), the obtained product is aged for 0.5-6h (preferably 0.5-4h) or not aged, at a temperature of 70-200 degrees Celsius (preferably 100-160 degrees Celsius) dried for 0.5-20h (preferably 1-6h) and at a temperature of 300-750 degrees Celsius (preferably 400-650 degrees Celsius) calcinated for 0.5-20h (preferably 1-6h);

(III) After the completion of the step (1-3), the obtained product is aged for 0.5-6h (preferably 0.5-4h) or not aged, at a temperature of 70-200 degrees Celsius (preferably 100-160 degrees Celsius) dried for 0.5-20h (preferably 1-6h) and at a temperature of 300-750 degrees Celsius (preferably 400-650 degrees Celsius) calcinated for 0.5-20h (preferably 1-6h);

(IV) After the completion of the step (2-1) while before the beginning

~~of the step (2-2), the obtained product is aged for 1-12h (preferably 4-12h), and then / or at a temperature of 60-250 degrees Celsius (preferably 100-200 degrees Celsius) dried for 0.5-20h (preferably 1-6h);~~

~~(V) After the completion of the step (2-2) while before the beginning of the step (2-3), the obtained product is aged for 0.5-6h (preferably 0.5-4h) or not aged, at a temperature of 70-200 degrees Celsius (preferably 100-160 degrees Celsius) dried for 0.5-20h (preferably 1-6h) and at a temperature of 300-750 degrees Celsius (preferably 400-650 degrees Celsius) calcinated for 0.5-20h (preferably 1-6h);~~

~~(VI) After the completion of the step (2-3), the obtained product is aged for 0.5-6h (preferably 0.5-4h) or not aged, at a temperature of 70-200 degrees Celsius (preferably 100-160 degrees Celsius) dried for 0.5-20h (preferably 1-6h) and at a temperature of 300-750 degrees Celsius (preferably 400-650 degrees Celsius) calcinated for 0.5-20h (preferably 1-6h);~~

~~(VII) After the completion of the step (3-1) while before the beginning of the step (3-2), the obtained product is aged for 0.5-8h (preferably 0.5-6h) or not aged, and then / or at a temperature of 60-250 degrees Celsius (preferably 100-200 degrees Celsius) dried for 0.5-20h (preferably 1-6h);~~

~~(VIII) After the completion of the step (3-2) while before the beginning of the step (3-3), the obtained product is aged for 0.5-6h (preferably 0.5-4h) or not aged, at a temperature of 70-200 degrees Celsius (preferably 100-160 degrees Celsius) dried for 0.5-20h (preferably 1-6h) and at a temperature of 300-750 degrees Celsius (preferably 400-650 degrees Celsius) calcinated for 0.5-20h (preferably 1-6h);~~

~~(IX) After the completion of the step (3-3) while before the beginning of the step (3-4), the obtained product is aged for 1-12h (preferably 4-12h), and then / or at a temperature of 60-250 degrees Celsius (preferably 100-200 degrees Celsius) dried for 0.5-20h (preferably 1-6h);~~

~~(X) After the completion of the step (3-4) while before the beginning of the step (3-5), the obtained product is aged for 0.5-6h (preferably 0.5-4h)~~

~~or not aged, at a temperature of 70-200 degrees Celsius (preferably 100-160 degrees Celsius) dried for 0.5-20h (preferably 1-6h) and at a temperature of 300-750 degrees Celsius (preferably 400-650 degrees Celsius) calcinated for 0.5-20h (preferably 1-6h);~~

~~(XI) After the completion of the step (3-5), the obtained product is aged for 0.5-6h (preferably 0.5-4h) or not aged, at a temperature of 70-200 degrees Celsius (preferably 100-160 degrees Celsius) dried for 0.5-20h (preferably 1-6h) and at a temperature of 300-750 degrees Celsius (preferably 400-650 degrees Celsius) calcinated for 0.5-20h (preferably 1-6h);~~

~~(XII) After the completion of the step (4-1) while before the beginning of the step (4-2), the obtained product is aged for 1-12h (preferably 4-12h), and then / or at a temperature of 60-250 degrees Celsius (preferably 100-200 degrees Celsius) dried for 0.5-20h (preferably 1-6h);~~

~~(XIII) After the completion of the step (4-2) while before the beginning of the step (4-3), the obtained product is aged for 0.5-6h (preferably 0.5-4h) or not aged, at a temperature of 70-200 degrees Celsius (preferably 100-160 degrees Celsius) dried for 0.5-20h (preferably 1-6h) and at a temperature of 300-750 degrees Celsius (preferably 400-650 degrees Celsius) calcinated for 0.5-20h (preferably 1-6h);~~

~~(IXV) After the completion of the step (4-3) while before the beginning of the step (4-4), the obtained product is aged for 0.5-8h (preferably 0.5-6h) or not aged, and then / or at a temperature of 60-250 degrees Celsius (preferably 100-200 degrees Celsius) dried for 0.5-20h (preferably 1-6h);~~

~~(XV) After the completion of the step (4-4) while before the beginning of the step (4-5), the obtained product is aged for 0.5-6h (preferably 0.5-4h) or not aged, at a temperature of 70-200 degrees Celsius (preferably 100-160 degrees Celsius) dried for 0.5-20h (preferably 1-6h) and at a temperature of 300-750 degrees Celsius (preferably 400-650 degrees Celsius) calcinated for 0.5-20h (preferably 1-6h);~~

~~(XVI) After the completion of the step (4-5), the obtained product is aged for 0.5-6h (preferably 0.5-4h) or not aged, at a temperature of 70-200 degrees Celsius (preferably 100-160 degrees Celsius) dried for 0.5-20h (preferably 1-6h) and at a temperature of 300-750 degrees Celsius (preferably 400-650 degrees Celsius) calcinated for 0.5-20h (preferably 1-6h).~~

~~97. The process according to Claim 7~~ A process for producing a hydrotreating catalyst, comprising at least the following steps:

(1-1) By unsaturated impregnation, onto a particulate porous refractory carrier (preferably one or more selected from the group consisting of porous refractory oxides, more preferably one or more selected from the group consisting of porous inorganic refractory oxides, more preferably one or more selected from the group consisting of oxides of a Group II, Group III or Group IV element in the element periodic table, more preferably one or more selected from the group consisting of silica, alumina, magnesia, silica-alumina, silica-magnesia and alumina-magnesia, further preferably alumina), an adsorbent I is supported, and optionally an organic alcohol having a carbon atom number of 1-5 (especially a monohydric alcohol or polyol, preferably one or more selected from the group consisting of ethylene glycol, propylene glycol, glycerin, pentaerythritol and xylitol) is simultaneously supported, wherein the adsorbent I is one or more selected from the group consisting of an organic carboxylic acid (especially a monohydric or polyhydric carboxylic acid, preferably a dihydric carboxylic acid) having a carbon atom number of 2-15 and an ammonium salt thereof, preferably one or more selected from the group consisting of acetic acid, oxalic acid, lactic acid, malonic acid, tartaric acid, malic acid, citric acid, trichloroacetic acid, monochloroacetic acid, mercaptoacetic acid, mercaptopropionic acid, ethylenediamine tetraacetic acid, nitrilotriacetic acid, diaminocyclohexane tetraacetic acid and ammonium salts thereof, the adsorbent I is used with an amount of 0.1-10wt% relative to the amount of the porous refractory carrier, the organic alcohol is used with an amount of 0.1-10wt% relative to the

amount of the porous refractory carrier,

(1-2) Onto the product obtained from the step (1-1), an active metal component B, optionally an active metal component C and optionally an auxiliary component are supported, wherein the active metal component B is one or more selected from the group consisting of Group VIII metals other than Ni in the element periodic table, preferably Co, the active metal component C is one or more selected from the group consisting of Group VIB metals in the element periodic table, preferably one or more selected from the group consisting of Mo and W, more preferably Mo, the auxiliary component is one or more selected from the group consisting of fluorine, silicon, phosphorus, titanium, zirconium and boron, preferably one or more selected from the group consisting of fluorine and phosphorus, more preferably phosphorus, and

(1-3) Before the beginning of the step (1-1) and / or after the completion of the step (1-2), onto the porous refractory carrier, an active metal component A, optionally the active metal component C and optionally the auxiliary component are supported, wherein the active metal component A is Ni,

with the proviso that the active metal component C is supported through at least one out of the step (1-2) and the step (1-3) (preferably through a combination of the step (1-2) and the step (1-3)),

or,

comprising at least the following steps:

(2-1) By saturated impregnation or oversaturated impregnation, onto a particulate porous refractory carrier (preferably one or more selected from the group consisting of porous refractory oxides, more preferably one or more selected from the group consisting of porous inorganic refractory oxides, more preferably one or more selected from the group consisting of oxides of a Group II, Group III or Group IV element in the element periodic table, more preferably one or more selected from the group consisting of silica, alumina, magnesia, silica-alumina, silica-magnesia and alumina-magnesia, further preferably alumina), an adsorbent II is

supported, wherein the adsorbent II is a polyol having a number averaged molecular weight Mn (by the GPC method) of 400-10000, preferably a polyol having a number averaged molecular weight Mn (by the GPC method) of 1000-8000, more preferably polyether glycol (especially polyethylene glycol) having a number averaged molecular weight Mn (by the GPC method) of 1000-8000, the adsorbent II is used with an amount of 0.1-10wt% relative to the amount of the porous refractory carrier;

(2-2) Onto the product obtained from the step (2-1), an active metal component A, optionally an active metal component C and optionally an auxiliary component are supported, wherein the active metal component A is Ni, the active metal component C is one or more selected from the group consisting of Group VIB metals in the element periodic table, preferably one or more selected from the group consisting of Mo and W, more preferably Mo, the auxiliary component is one or more selected from the group consisting of fluorine, silicon, phosphorus, titanium, zirconium and boron, preferably one or more selected from the group consisting of fluorine and phosphorus, more preferably phosphorus, and

(2-3) Before the beginning of the step (2-1) and / or after the completion of the step (2-2), onto the porous refractory carrier, an active metal component B, optionally the active metal component C and optionally the auxiliary component are supported, wherein the active metal component B is one or more selected from the group consisting of Group VIII metals other than Ni in the element periodic table, preferably Co,

with the proviso that the active metal component C is supported through at least one out of the step (2-2) and the step (2-3) (preferably through a combination of the step (2-2) and the step (2-3)),

or,

comprising at least the following steps:

(3-1) By unsaturated impregnation, onto a particulate porous refractory carrier (preferably one or more selected from the group consisting of porous refractory oxides, more preferably one or more selected from the group consisting of porous inorganic refractory oxides,

more preferably one or more selected from the group consisting of oxides of a Group II, Group III or Group IV element in the element periodic table, more preferably one or more selected from the group consisting of silica, alumina, magnesia, silica-alumina, silica-magnesia and alumina-magnesia, further preferably alumina), an adsorbent I is supported, and optionally an organic alcohol having a carbon atom number of 1-5 (especially a monohydric alcohol or polyol, preferably one or more selected from the group consisting of ethylene glycol, propylene glycol, glycerin, pentaerythritol and xylitol) is simultaneously supported, wherein the adsorbent I is one or more selected from the group consisting of organic carboxylic acids having a carbon atom number of 2-15 (especially monohydric or polyhydric carboxylic acids, preferably dihydric carboxylic acids) and ammonium salts thereof, preferably one or more selected from the group consisting of acetic acid, oxalic acid, lactic acid, malonic acid, tartaric acid, malic acid, citric acid, trichloroacetic acid, monochloroacetic acid, mercaptoacetic acid, mercaptopropionic acid, ethylenediamine tetraacetic acid, nitrilotriacetic acid, diaminocyclohexane tetraacetic acid and ammonium salts thereof, the adsorbent I is used with an amount of 0.1-10wt% relative to the amount of the porous refractory carrier, the organic alcohol is used with an amount of 0.1-10wt% relative to the amount of the porous refractory carrier,

(3-2) Onto the product obtained from the step (3-1), an active metal component B, optionally an active metal component C and optionally an auxiliary component are supported, wherein the active metal component B is one or more selected from the group consisting of Group VIII metals other than Ni in the element periodic table, preferably Co, the active metal component C is one or more selected from the group consisting of Group VIB metals in the element periodic table, preferably one or more selected from the group consisting of Mo and W, more preferably Mo, the auxiliary component is one or more selected from the group consisting of fluorine, silicon, phosphorus, titanium, zirconium and boron, preferably one or more selected from the group consisting of fluorine and phosphorus, more

preferably phosphorus,

(3-3) By saturated impregnation or oversaturated impregnation, onto the product obtained from the step (3-2), an adsorbent II is supported, wherein the adsorbent II is a polyol having a number averaged molecular weight Mn (by the GPC method) of 400-10000, preferably a polyol having a number averaged molecular weight Mn (by the GPC method) of 1000-8000, more preferably polyether glycol (especially polyethylene glycol) having a number averaged molecular weight Mn (by the GPC method) of 1000-8000, the adsorbent II is used with an amount of 0.1-10wt% relative to the amount of the porous refractory carrier;

(3-4) Onto the product obtained from the step (3-3), an active metal component A, optionally the active metal component C and optionally the auxiliary component are supported, wherein the active metal component A is Ni, and

(3-5) Optionally before the beginning of the step (3-1), after the completion of the step (3-2), while before the beginning of the step (3-3) and / or after the completion of the step (3-4), onto the porous refractory carrier, the active metal component C and optionally the auxiliary component are supported,

with the proviso that the active metal component C is supported through at least one out of the step (3-2), the step (3-4) and the step (3-5) (preferably through a combination of the step (3-2) and the step (3-4)),

or,

comprising at least the following steps:

(4-1) By saturated impregnation or oversaturated impregnation, onto a particulate porous refractory carrier (preferably one or more selected from the group consisting of porous refractory oxides, more preferably one or more selected from the group consisting of porous inorganic refractory oxides, more preferably one or more selected from the group consisting of oxides of a Group II, Group III or Group IV element in the element periodic table, more preferably one or more selected from the group consisting of silica, alumina, magnesia, silica-alumina, silica-magnesia and

alumina-magnesia, further preferably alumina), an adsorbent II is supported, wherein the adsorbent II is a polyol having a number averaged molecular weight Mn (by the GPC method) of 400-10000, preferably a polyol having a number averaged molecular weight Mn (by the GPC method) of 1000-8000, more preferably polyether glycol (especially polyethylene glycol) having a number averaged molecular weight Mn (by the GPC method) of 1000-8000, wherein the adsorbent II is used with an amount of 0.1-10wt% relative to the amount of the porous refractory carrier;

(4-2) Onto the product obtained from the step (4-1), an active metal component A, optionally an active metal component C and optionally an auxiliary component are supported, wherein the active metal component A is Ni, the active metal component C is one or more selected from the group consisting of Group VIB metals in the element periodic table, preferably one or more selected from the group consisting of Mo and W, more preferably Mo, the auxiliary component is one or more selected from the group consisting of fluorine, silicon, phosphorus, titanium, zirconium and boron, preferably one or more selected from the group consisting of fluorine and phosphorus, more preferably phosphorus,

(4-3) By unsaturated impregnation, onto the product obtained from the step (4-2), an adsorbent I is supported, and optionally an organic alcohol having a carbon atom number of 1-5 (especially a monohydric alcohol or polyol, preferably one or more selected from the group consisting of ethylene glycol, propylene glycol, glycerin, pentaerythritol and xylitol) is simultaneously supported, wherein the adsorbent I is one or more selected from the group consisting of organic carboxylic acids (especially monohydric or polyhydric carboxylic acids, preferably dihydric carboxylic acids) having a carbon atom number of 2-15 and ammonium salts thereof, preferably one or more selected from the group consisting of acetic acid, oxalic acid, lactic acid, malonic acid, tartaric acid, malic acid, citric acid, trichloroacetic acid, monochloroacetic acid, mercaptoacetic acid, mercaptopropionic acid, ethylenediamine tetraacetic acid,

nitrilotriacetic acid, diaminocyclohexane tetraacetic acid and ammonium salts thereof, the adsorbent I is used with an amount of 0.1-10wt% relative to the amount of the porous refractory carrier, the organic alcohol is used with an amount of 0.1-10wt% relative to the amount of the porous refractory carrier,

(4-4) Onto the product obtained from the step (4-3), an active metal component B, optionally the active metal component C and optionally the auxiliary component are supported, wherein the active metal component B is one or more selected from the group consisting of Group VIII metals other than Ni in the element periodic table, preferably Co, and

(4-5) Optionally before the beginning of the step (4-1), after the completion of the step (4-2), while before the beginning of the step (4-3) and / or after the completion of the step (4-4), onto the porous refractory carrier, the active metal component C and optionally the auxiliary component are supported,

with the proviso that the active metal component C is supported through at least one out of the step (4-2), the step (4-4) and the step (4-5) (preferably through a combination of the step (4-2) and the step (4-4)), wherein the active metal component C includes Mo, and Mo is supported through a combination of the step (1-2) and the step (1-3), a combination of the step (2-3) and the step (2-2), a combination of the step (3-2) and the step (3-4) or a combination of the step (4-4) and the step (4-2), wherein in the combination, the ratio by molar of the amount of Mo to be supported in the preceding step to the amount of Mo to be supported in the succeeding step is 0.4-2.5: 1, preferably 0.4-2.0: 1

~~10~~8. Use of the hydrotreating catalyst according to Claim 1~~ or a hydrotreating catalyst produced in line with the process according to Claim 7~~ in the hydrodesulfurization of heavy distillate oil (especially diesel oil) as a hydrodesulfurization catalyst.

~~11~~9. A process for hydrodesulfurizating heavy distillate oil (especially diesel oil), comprising a step of contacting a heavy distillate oil feedstock with the hydrotreating catalyst according to Claim 1~~ or a hydrotreating catalyst~~

~~produced in line with the process according to Claim 7~~ under hydrodesulfurization conditions.

CLAIMS

1. A hydrotreating catalyst, which is in a particulate form, and comprises a porous refractory carrier (preferably one or more selected from the group consisting of porous refractory oxides, more preferably one or more selected from the group consisting of porous inorganic refractory oxides, more preferably one or more selected from the group consisting of oxides of a Group II, Group III or Group IV element in the element periodic table, more preferably one or more selected from the group consisting of silica, alumina, magnesia, silica-alumina, silica-magnesia and alumina-magnesia, further preferably alumina) and an active metal component A, an active metal component B, an active metal component C and optionally an auxiliary component supported on the porous refractory carrier, the active metal component A is Ni, the active metal component B is one or more selected from the group consisting of Group VIII metals other than Ni in the element periodic table, preferably one or more selected from the group consisting of Group VIII non-noble metals other than Ni in the element periodic table, more preferably Co, the active metal component C is one or more selected from the group consisting of Group VIB metals in the element periodic table, preferably one or more selected from the group consisting of Mo and W, more preferably Mo, the auxiliary component is one or more selected from the group consisting of fluorine, silicon, phosphorus, titanium, zirconium and boron, preferably one or more selected from the group consisting of fluorine and phosphorus, more preferably phosphorus,

wherein,

the concentration distribution of the active metal component A meets the following condition (I) or (II),

Condition (I): throughout the cross-section of each individual catalyst particle, the concentration thereof substantially uniformly distributes,

Condition (II): throughout the cross-section of each individual catalyst particle, the concentration thereof meets the following formulas (1)

and (2) at the same time:

Formula (1): $C^{A}_{out}>C^{A}_{1/2}>1$, preferably $C^{A}_{out}>C^{A}_{1/4}>C^{A}_{1/2}>C^{A}_{3/4}>1$, more preferably $C^{A}_{out}>C^{A}_{opt}>1$, more preferably $C^{A}_{out} / C^{A}_{1/2}=1.5\text{-}2.6$, preferably 1.7-2.5, further preferably $C^{A}_{out} / C^{A}_{1/4}=1.2\text{-}1.8$, preferably 1.3-1.7, further preferably $C^{A}_{1/4} / C^{A}_{1/2}=1.1\text{-}1.7$, preferably 1.2-1.6,

Formula (2): $C^{A}_{out}\geq 1.5$, preferably $C^{A}_{out}\geq 2.0$, more preferably $C^{A}_{out}\geq 2.4$, but $C^{A}_{out}\leq 5.0$, preferably $C^{A}_{out}\leq 4.0$,

wherein the symbol C^{A}_{out} represents the ratio of the concentration of the active metal component A at an arbitrary position point P_A on the outmost edge of the cross-section of the catalyst particle to the concentration of the active metal component A at the central point on the cross-section of the catalyst particle, and assuming that the length value of the line segment connecting the central point and the position point P_A on the cross-section of the catalyst particle is L_A, the symbol $C^{A}_{1/2}$ represents the ratio of the concentration of the active metal component A at the position point on the line segment $(1/2)L_A$ away from the position point P_A to the concentration of the active metal component A at the central point on the cross-section of the catalyst particle, the symbol $C^{A}_{1/4}$ represents the ratio of the concentration of the active metal component A at the position point on the line segment $(1/4)L_A$ away from the position point P_A to the concentration of the active metal component A at the central point on the cross-section of the catalyst particle, the symbol $C^{A}_{3/4}$ represents the ratio of the concentration of the active metal component A at the position point on the line segment $(3/4)L_A$ away from the position point P_A to the concentration of the active metal component A at the central point on the cross-section of the catalyst particle, the symbol C^{A}_{opt} represents the ratio of the concentration of the active metal component A at an arbitrary position point on the line segment (not including the central point and the position point P_A) to the concentration of the active metal component A at the central point on the cross-section of the catalyst particle,

and, the concentration distribution of the active metal component B meets the following condition (III) or (IV),

Condition (III): throughout the cross-section of each individual catalyst particle, the concentration thereof substantially uniformly distributes.

Condition (IV): throughout the cross-section of each individual catalyst particle, the concentration thereof meets the following formulas (3) and (4) at the same time:

Formula (3): $C^B_{out}<C^B_{1/2}<1$, preferably $C^B_{out}<C^B_{1/4}<C^B_{1/2}<C^B_{3/4}<1$, more preferably $C^B_{out}<C^B_{opt}<1$, more preferably C^B_{out} / $C^B_{1/2}$=0.2-0.8, preferably 0.2-0.7, further preferably C^B_{out} / $C^B_{1/4}$=0.3-0.9, preferably 0.3-0.85, further preferably $C^B_{1/4}$ / $C^B_{1/2}$=0.4-0.9, preferably 0.4-0.87,

Formula (4): $C^B_{out}\leq 0.80$, preferably $C^B_{out}\leq 0.70$, preferably $C^B_{out}\leq 0.68$, preferably $C^B_{out}\leq 0.60$, but $C^B_{out}\geq 0.10$, preferably $C^B_{out}\geq 0.20$,

wherein the symbol C^B_{out} represents the ratio of the concentration of the active metal component B at an arbitrary position point P_B on the outmost edge of the cross-section of the catalyst particle to the concentration of the active metal component B at the central point on the cross-section of the catalyst particle, and assuming that the length value of the line segment connecting the central point and the position point P_B on the cross-section of the catalyst particle is L_B, the symbol $C^B_{1/2}$ represents the ratio of the concentration of the active metal component B at the position point on the line segment (1/2)L_B away from the position point P_B to the concentration of the active metal component B at the central point on the cross-section of the catalyst particle, the symbol $C^B_{1/4}$ represents the ratio of the concentration of the active metal component B at the position point on the line segment (1/4)L_B away from the position point P_B to the concentration of the active metal component B at the central point on the cross-section of the catalyst particle, the symbol $C^B_{3/4}$ represents the ratio of the concentration of the active metal component B at the position point on the line segment (3/4)L_B away from the position point P_B to the concentration of the active metal component B at the central point on the cross-section of the catalyst particle, the symbol C^B_{opt} represents the ratio of the concentration of the active metal component B at an arbitrary

position point on the line segment (not including the central point and the position point P_B) to the concentration of the active metal component B at the central point on the cross-section of the catalyst particle,

with the proviso that, the concentration distribution of the active metal component A and the concentration distribution of the active metal component B do not meet the conditions (I) and (III) at the same time,

preferably, the concentration distribution of the active metal component A meets the condition (II), and at the same time, the concentration distribution of the active metal component B meets the condition (IV).

2. The hydrotreating catalyst according to Claim 1, having a specific surface area (by the BET method) of 100-260 m^2 / g, preferably 120-220 m^2 / g, and a pore volume (by the BET method) of 0.20-0.60ml / g, preferably 0.20-0.50ml / g.

3. The hydrotreating catalyst according to Claim 1, wherein the content of the porous refractory carrier is 45-89wt%, 46-87wt% or 55-85wt%, preferably the remaining; the content of the active metal component A (as NiO) is 1-8wt%; the content of the active metal component B (as the corresponding oxide, for example, Co as CoO) is at least 0.5wt%, 1wt% or 1.5wt%, at most 6wt% or 8wt%; the content of the active metal component C (as the corresponding oxide) is 6-60wt%, preferably 6-40wt%, especially the content of Mo (as MoO3) is at least 6wt%, 8wt% or 10wt%, at most 26wt%, 32wt% or 40wt%, and / or, the content of W (as WO_3) is 6-28wt%; and the content of the auxiliary component (as the corresponding element) is 30wt% or less, preferably 20wt% or less, especially the content of phosphorus (as P_2O_5) is 1-6wt%, relative to the weight of the catalyst.

4. The hydrotreating catalyst according to Claim 1, wherein the active metal component C is Mo, and the concentration distribution of Mo meets the following condition (V) or (VI),

Condition (V): throughout the cross-section of each individual catalyst particle, the concentration thereof substantially uniformly

distributes,

Condition (VI): throughout the cross-section of each individual catalyst particle, the concentration thereof meets the following formulas (5) and (6) at the same time:

Formula (5): $C^{Mo}_{out}<C^{Mo}_{1/2}<1$, preferably $C^{Mo}_{out}<C^{Mo}_{1/4}<C^{Mo}_{1/2}<C^{Mo}_{3/4}<1$, more preferably $C^{Mo}_{out}<C^{Mo}_{opt}<1$,

Formula (6): $0.08\leq C^{Mo}_{out}\leq 0.70$,

wherein the symbol C^{Mo}_{out} represents the ratio of the concentration of the active metal component Mo at an arbitrary position point P_{Mo} on the outmost edge of the cross-section of the catalyst particle to the concentration of the active metal component Mo at the central point on the cross-section of the catalyst particle, and assuming that the length value of the line segment connecting the central point and the position point P_{Mo} on the cross-section of the catalyst particle is L_{Mo}, the symbol $C^{Mo}_{1/2}$ represents the ratio of the concentration of the active metal component Mo at the position point on the line segment $(1/2)L_{Mo}$ away from the position point P_{Mo} to the concentration of the active metal component Mo at the central point on the cross-section of the catalyst particle, the symbol $C^{Mo}_{1/4}$ represents the ratio of the concentration of the active metal component Mo at the position point on the line segment $(1/4)L_{Mo}$ away from the position point P_{Mo} to the concentration of the active metal component Mo at the central point on the cross-section of the catalyst particle, the symbol $C^{Mo}_{3/4}$ represents the ratio of the concentration of the active metal component Mo at the position point on the line segment $(3/4)L_{Mo}$ away from the position point P_{Mo} to the concentration of the active metal component Mo at the central point on the cross-section of the catalyst particle, the symbol C^{Mo}_{opt} represents the ratio of the concentration of the active metal component Mo at an arbitrary position point on the line segment (not including the central point and the position point P_{Mo}) to the concentration of the active metal component Mo at the central point on the cross-section of the catalyst particle,

or,

the active metal component C is a combination of Mo and W, the concentration distribution of Mo meets the following condition (V) or (VI), while the concentration distribution of W meets the following condition (VII) or (VIII),

Condition (V): throughout the cross-section of each individual catalyst particle, the concentration thereof substantially uniformly distributes,

Condition (VI): throughout the cross-section of each individual catalyst particle, the concentration thereof meets the following formulas (5) and (6) at the same time:

Formula (5): $C^{Mo}_{out}<C^{Mo}_{1/2}<1$, preferably $C^{Mo}_{out}<C^{Mo}_{1/4}<C^{Mo}_{1/2}<C^{Mo}_{3/4}<1$, more preferably $C^{Mo}_{out}<C^{Mo}_{opt}<1$,

Formula (6): $0.08\leq C^{Mo}_{out}\leq 0.70$,

wherein the symbol C^{Mo}_{out} represents the ratio of the concentration of the active metal component Mo at an arbitrary position point P_{Mo} on the outmost edge of the cross-section of the catalyst particle to the concentration of the active metal component Mo at the central point on the cross-section of the catalyst particle, and assuming that the length value of the line segment connecting the central point and the position point P_{Mo} on the cross-section of the catalyst particle is L_{Mo}, the symbol $C^{Mo}_{1/2}$ represents the ratio of the concentration of the active metal component Mo at the position point on the line segment $(1/2)L_{Mo}$ away from the position point P_{Mo} to the concentration of the active metal component Mo at the central point on the cross-section of the catalyst particle, the symbol $C^{Mo}_{1/4}$ represents the ratio of the concentration of the active metal component Mo at the position point on the line segment $(1/4)L_{Mo}$ away from the position point P_{Mo} to the concentration of the active metal component Mo at the central point on the cross-section of the catalyst particle, the symbol $C^{Mo}_{3/4}$ represents the ratio of the concentration of the active metal component Mo at the position point on the line segment $(3/4)L_{Mo}$ away from the position point P_{Mo} to the concentration of the active metal component Mo at the central point on the cross-section of the catalyst particle, the symbol C^{Mo}_{opt}

represents the ratio of the concentration of the active metal component Mo at an arbitrary position point on the line segment (not including the central point and the position point P_{Mo}) to the concentration of the active metal component Mo at the central point on the cross-section of the catalyst particle,

Condition (VII): throughout the cross-section of each individual catalyst particle, the concentration thereof substantially uniformly distributes,

Condition (VIII): throughout the cross-section of each individual catalyst particle, the concentration thereof meets the following formulas (7) and (8) at the same time:

Formula (7): $C^W_{out}>C^W_{1/2}>1$, preferably $C^W_{out}>C^W_{1/4}>C^W_{1/2}>C^W_{3/4}>1$, more preferably $C^W_{out}>C^W_{opt}>1$,

Formula (8): $7.0\geq C^W_{out}\geq 1.2$,

wherein the symbol C^W_{out} represents the ratio of the concentration of the active metal component W at an arbitrary position point P_W on the outmost edge of the cross-section of the catalyst particle to the concentration of the active metal component W at the central point on the cross-section of the catalyst particle, and assuming that the length value of the line segment connecting the central point and the position point P_W on the cross-section of the catalyst particle is L_W, the symbol $C^W_{1/2}$ represents the ratio of the concentration of the active metal component W at the position point on the line segment (1/2)L_W away from the position point P_W to the concentration of the active metal component W at the central point on the cross-section of the catalyst particle, the symbol $C^W_{1/4}$ represents the ratio of the concentration of the active metal component W at the position point on the line segment (1/4)L_W away from the position point P_W to the concentration of the active metal component W at the central point on the cross-section of the catalyst particle, the symbol $C^W_{3/4}$ represents the ratio of the concentration of the active metal component W at the position point on the line segment (3/4)L_W away from the position point P_W to the concentration of the active metal component W at the

central point on the cross-section of the catalyst particle, the symbol C^{W}_{opt} represents the ratio of the concentration of the active metal component W at an arbitrary position point on the line segment (not including the central point and the position point P_W) to the concentration of the active metal component W at the central point on the cross-section of the catalyst particle.

5. The hydrotreating catalyst according to Claim 1, wherein according to the formula (1), on the cross-section of each individual catalyst particle, the concentration of the active metal component A along the line segment from the position point P_A to the central point substantially gradually decreases, it is preferable to meet the formula (1'), with the proviso that when the calculated value of the relation $(d2_A-d1_A) / L_A$ is 5% or less (preferably 2% or less, more preferably 1% or less, more preferably 0.5% or less), $C^{A}_{opt-1}>90\%C^{A}_{opt-2}$ (preferably $C^{A}_{opt-1}>95\%C^{A}_{opt-2}$, more preferably $C^{A}_{opt-1}>98\%C^{A}_{opt-2}$) holds, it is more preferably that the formula (1) is the following formula (1'),

Formula (1'): $C^{A}_{out}>C^{A}_{opt-1}>C^{A}_{opt-2}>1$,

wherein the symbol C^{A}_{opt-1} represents the ratio of the concentration of the active metal component A at an arbitrary position point opt-1 on the line segment (not including the position point P_A and the central point) to the concentration of the active metal component A at the central point on the cross-section of the catalyst particle, the symbol C^{A}_{opt-2} represents the ratio of the concentration of the active metal component A at an arbitrary position point opt-2 on the line segment (not including the position point P_A and the central point) to the concentration of the active metal component A at the central point on the cross-section of the catalyst particle, and assuming that the linear distance between the position point P_A and the position point opt-1 is $d1_A$ in value, while the linear distance between the position point P_A and the position point opt-2 is $d2_A$ in value, then $d1_A / d2_A<1$,

or,

according to the formula (3), on the cross-section of each individual

catalyst particle, the concentration of the active metal component B along the line segment from the position point P_B to the central point substantially gradually increases, it is preferable to meet the formula (3'), with the proviso that when the calculated value of the relation $(d2_B\text{-}d1_B) / L_B$ is 5% or less (preferably 2% or less, more preferably 1% or less, more preferably 0.5% or less), $C^B_{opt\text{-}1}<110\%C^B_{opt\text{-}2}$ (preferably $C^B_{opt\text{-}1}<105\%C^B_{opt\text{-}2}$, more preferably $C^B_{opt\text{-}1}<102\%C^B_{opt\text{-}2}$) holds, it is more preferably that the formula (3) is the following formula (3'),

Formula (3'): $C^B_{out}<C^B_{opt\text{-}1}<C^B_{opt\text{-}2}<1$,

wherein the symbol $C^B_{opt\text{-}1}$ represents the ratio of the concentration of the active metal component B at an arbitrary position point opt-1 on the line segment (not including the position point P_B and the central point) to the concentration of the active metal component B at the central point on the cross-section of the catalyst particle, the symbol $C^B_{opt\text{-}2}$ represents the ratio of the concentration of the active metal component B at an arbitrary position point opt-2 on the line segment (not including the position point P_B and the central point) to the concentration of the active metal component B at the central point on the cross-section of the catalyst particle, and assuming that the linear distance between the position point P_B and the position point opt-1 is $d1_B$ in value, while the linear distance between the position point P_B and the position point opt-2 is $d2_B$ in value, then $d1_B / d2_B<1$.

6. The hydrotreating catalyst according to Claim 1, wherein on the outmost surface of the catalyst particle, the ratio of the concentration of the active metal component A to the concentration of the active metal component C (preferably the ratio of the concentration of Ni to the concentration of Mo, the ratio of the concentration of Ni to the concentration of W or the ratio of the concentration of Ni to the concentration of (W+Mo)) is 0.22-0.80, preferably 0.30-0.70, and / or, at the central point of the catalyst particle, the ratio of the concentration of the active metal component B to the concentration of the active metal component C (preferably the ratio of the concentration of Co to the

concentration of Mo) is 0.20-0.78, preferably 0.25-0.65.

7. A process for producing a hydrotreating catalyst, comprising at least the following steps:

(1-1) By unsaturated impregnation, onto a particulate porous refractory carrier (preferably one or more selected from the group consisting of porous refractory oxides, more preferably one or more selected from the group consisting of porous inorganic refractory oxides, more preferably one or more selected from the group consisting of oxides of a Group II, Group III or Group IV element in the element periodic table, more preferably one or more selected from the group consisting of silica, alumina, magnesia, silica-alumina, silica-magnesia and alumina-magnesia, further preferably alumina), an adsorbent I is supported, and optionally an organic alcohol having a carbon atom number of 1-5 (especially a monohydric alcohol or polyol, preferably one or more selected from the group consisting of ethylene glycol, propylene glycol, glycerin, pentaerythritol and xylitol) is simultaneously supported, wherein the adsorbent I is one or more selected from the group consisting of an organic carboxylic acid (especially a monohydric or polyhydric carboxylic acid, preferably a dihydric carboxylic acid) having a carbon atom number of 2-15 and an ammonium salt thereof, preferably one or more selected from the group consisting of acetic acid, oxalic acid, lactic acid, malonic acid, tartaric acid, malic acid, citric acid, trichloroacetic acid, monochloroacetic acid, mercaptoacetic acid, mercaptopropionic acid, ethylenediamine tetraacetic acid, nitrilotriacetic acid, diaminocyclohexane tetraacetic acid and ammonium salts thereof, the adsorbent I is used with an amount of 0.1-10wt% relative to the amount of the porous refractory carrier, the organic alcohol is used with an amount of 0.1-10wt% relative to the amount of the porous refractory carrier,

(1-2) Onto the product obtained from the step (1-1), an active metal component B, optionally an active metal component C and optionally an auxiliary component are supported, wherein the active metal component B is one or more selected from the group consisting of Group VIII metals

other than Ni in the element periodic table, preferably Co, the active metal component C is one or more selected from the group consisting of Group VIB metals in the element periodic table, preferably one or more selected from the group consisting of Mo and W, more preferably Mo, the auxiliary component is one or more selected from the group consisting of fluorine, silicon, phosphorus, titanium, zirconium and boron, preferably one or more selected from the group consisting of fluorine and phosphorus, more preferably phosphorus, and

(1-3) Before the beginning of the step (1-1) and / or after the completion of the step (1-2), onto the porous refractory carrier, an active metal component A, optionally the active metal component C and optionally the auxiliary component are supported, wherein the active metal component A is Ni,

with the proviso that the active metal component C is supported through at least one out of the step (1-2) and the step (1-3) (preferably through a combination of the step (1-2) and the step (1-3)),

or,

comprising at least the following steps:

(2-1) By saturated impregnation or oversaturated impregnation, onto a particulate porous refractory carrier (preferably one or more selected from the group consisting of porous refractory oxides, more preferably one or more selected from the group consisting of porous inorganic refractory oxides, more preferably one or more selected from the group consisting of oxides of a Group II, Group III or Group IV element in the element periodic table, more preferably one or more selected from the group consisting of silica, alumina, magnesia, silica-alumina, silica-magnesia and alumina-magnesia, further preferably alumina), an adsorbent II is supported, wherein the adsorbent II is a polyol having a number averaged molecular weight Mn (by the GPC method) of 400-10000, preferably a polyol having a number averaged molecular weight Mn (by the GPC method) of 1000-8000, more preferably polyether glycol (especially polyethylene glycol) having a number averaged molecular weight Mn (by

the GPC method) of 1000-8000, the adsorbent II is used with an amount of 0.1-10wt% relative to the amount of the porous refractory carrier;

(2-2) Onto the product obtained from the step (2-1), an active metal component A, optionally an active metal component C and optionally an auxiliary component are supported, wherein the active metal component A is Ni, the active metal component C is one or more selected from the group consisting of Group VIB metals in the element periodic table, preferably one or more selected from the group consisting of Mo and W, more preferably Mo, the auxiliary component is one or more selected from the group consisting of fluorine, silicon, phosphorus, titanium, zirconium and boron, preferably one or more selected from the group consisting of fluorine and phosphorus, more preferably phosphorus, and

(2-3) Before the beginning of the step (2-1) and / or after the completion of the step (2-2), onto the porous refractory carrier, an active metal component B, optionally the active metal component C and optionally the auxiliary component are supported, wherein the active metal component B is one or more selected from the group consisting of Group VIII metals other than Ni in the element periodic table, preferably Co,

with the proviso that the active metal component C is supported through at least one out of the step (2-2) and the step (2-3) (preferably through a combination of the step (2-2) and the step (2-3)),

or,

comprising at least the following steps:

(3-1) By unsaturated impregnation, onto a particulate porous refractory carrier (preferably one or more selected from the group consisting of porous refractory oxides, more preferably one or more selected from the group consisting of porous inorganic refractory oxides, more preferably one or more selected from the group consisting of oxides of a Group II, Group III or Group IV element in the element periodic table, more preferably one or more selected from the group consisting of silica, alumina, magnesia, silica-alumina, silica-magnesia and alumina-magnesia, further preferably alumina), an adsorbent I is supported, and optionally an

organic alcohol having a carbon atom number of 1-5 (especially a monohydric alcohol or polyol, preferably one or more selected from the group consisting of ethylene glycol, propylene glycol, glycerin, pentaerythritol and xylitol) is simultaneously supported, wherein the adsorbent I is one or more selected from the group consisting of organic carboxylic acids having a carbon atom number of 2-15 (especially monohydric or polyhydric carboxylic acids, preferably dihydric carboxylic acids) and ammonium salts thereof, preferably one or more selected from the group consisting of acetic acid, oxalic acid, lactic acid, malonic acid, tartaric acid, malic acid, citric acid, trichloroacetic acid, monochloroacetic acid, mercaptoacetic acid, mercaptopropionic acid, ethylenediamine tetraacetic acid, nitrilotriacetic acid, diaminocyclohexane tetraacetic acid and ammonium salts thereof, the adsorbent I is used with an amount of 0.1-10wt% relative to the amount of the porous refractory carrier, the organic alcohol is used with an amount of 0.1-10wt% relative to the amount of the porous refractory carrier,

(3-2) Onto the product obtained from the step (3-1), an active metal component B, optionally an active metal component C and optionally an auxiliary component are supported, wherein the active metal component B is one or more selected from the group consisting of Group VIII metals other than Ni in the element periodic table, preferably Co, the active metal component C is one or more selected from the group consisting of Group VIB metals in the element periodic table, preferably one or more selected from the group consisting of Mo and W, more preferably Mo, the auxiliary component is one or more selected from the group consisting of fluorine, silicon, phosphorus, titanium, zirconium and boron, preferably one or more selected from the group consisting of fluorine and phosphorus, more preferably phosphorus,

(3-3) By saturated impregnation or oversaturated impregnation, onto the product obtained from the step (3-2), an adsorbent II is supported, wherein the adsorbent II is a polyol having a number averaged molecular weight Mn (by the GPC method) of 400-10000, preferably a polyol having

a number averaged molecular weight Mn (by the GPC method) of 1000-8000, more preferably polyether glycol (especially polyethylene glycol) having a number averaged molecular weight Mn (by the GPC method) of 1000-8000, the adsorbent II is used with an amount of 0.1-10wt% relative to the amount of the porous refractory carrier;

(3-4) Onto the product obtained from the step (3-3), an active metal component A, optionally the active metal component C and optionally the auxiliary component are supported, wherein the active metal component A is Ni, and

(3-5) Optionally before the beginning of the step (3-1), after the completion of the step (3-2), while before the beginning of the step (3-3) and / or after the completion of the step (3-4), onto the porous refractory carrier, the active metal component C and optionally the auxiliary component are supported,

with the proviso that the active metal component C is supported through at least one out of the step (3-2), the step (3-4) and the step (3-5) (preferably through a combination of the step (3-2) and the step (3-4)),

or,

comprising at least the following steps:

(4-1) By saturated impregnation or oversaturated impregnation, onto a particulate porous refractory carrier (preferably one or more selected from the group consisting of porous refractory oxides, more preferably one or more selected from the group consisting of porous inorganic refractory oxides, more preferably one or more selected from the group consisting of oxides of a Group II, Group III or Group IV element in the element periodic table, more preferably one or more selected from the group consisting of silica, alumina, magnesia, silica-alumina, silica-magnesia and alumina-magnesia, further preferably alumina), an adsorbent II is supported, wherein the adsorbent II is a polyol having a number averaged molecular weight Mn (by the GPC method) of 400-10000, preferably a polyol having a number averaged molecular weight Mn (by the GPC method) of 1000-8000, more preferably polyether glycol (especially

polyethylene glycol) having a number averaged molecular weight Mn (by the GPC method) of 1000-8000, wherein the adsorbent II is used with an amount of 0.1-10wt% relative to the amount of the porous refractory carrier;

(4-2) Onto the product obtained from the step (4-1), an active metal component A, optionally an active metal component C and optionally an auxiliary component are supported, wherein the active metal component A is Ni, the active metal component C is one or more selected from the group consisting of Group VIB metals in the element periodic table, preferably one or more selected from the group consisting of Mo and W, more preferably Mo, the auxiliary component is one or more selected from the group consisting of fluorine, silicon, phosphorus, titanium, zirconium and boron, preferably one or more selected from the group consisting of fluorine and phosphorus, more preferably phosphorus,

(4-3) By unsaturated impregnation, onto the product obtained from the step (4-2), an adsorbent I is supported, and optionally an organic alcohol having a carbon atom number of 1-5 (especially a monohydric alcohol or polyol, preferably one or more selected from the group consisting of ethylene glycol, propylene glycol, glycerin, pentaerythritol and xylitol) is simultaneously supported, wherein the adsorbent I is one or more selected from the group consisting of organic carboxylic acids (especially monohydric or polyhydric carboxylic acids, preferably dihydric carboxylic acids) having a carbon atom number of 2-15 and ammonium salts thereof, preferably one or more selected from the group consisting of acetic acid, oxalic acid, lactic acid, malonic acid, tartaric acid, malic acid, citric acid, trichloroacetic acid, monochloroacetic acid, mercaptoacetic acid, mercaptopropionic acid, ethylenediamine tetraacetic acid, nitrilotriacetic acid, diaminocyclohexane tetraacetic acid and ammonium salts thereof, the adsorbent I is used with an amount of 0.1-10wt% relative to the amount of the porous refractory carrier, the organic alcohol is used with an amount of 0.1-10wt% relative to the amount of the porous refractory carrier,

(4-4) Onto the product obtained from the step (4-3), an active metal component B, optionally the active metal component C and optionally the auxiliary component are supported, wherein the active metal component B is one or more selected from the group consisting of Group VIII metals other than Ni in the element periodic table, preferably Co, and

(4-5) Optionally before the beginning of the step (4-1), after the completion of the step (4-2), while before the beginning of the step (4-3) and / or after the completion of the step (4-4), onto the porous refractory carrier, the active metal component C and optionally the auxiliary component are supported,

with the proviso that the active metal component C is supported through at least one out of the step (4-2), the step (4-4) and the step (4-5) (preferably through a combination of the step (4-2) and the step (4-4)), wherein the active metal component C includes Mo, and Mo is supported through a combination of the step (1-2) and the step (1-3), a combination of the step (2-3) and the step (2-2), a combination of the step (3-2) and the step (3-4) or a combination of the step (4-4) and the step (4-2), wherein in the combination, the ratio by molar of the amount of Mo to be supported in the preceding step to the amount of Mo to be supported in the succeeding step is 0.4-2.5: 1, preferably 0.4-2.0: 1

8. Use of the hydrotreating catalyst according to Claim 1 in the hydrodesulfurization of heavy distillate oil (especially diesel oil) as a hydrodesulfurization catalyst.

9. A process for hydrodesulfurizating heavy distillate oil (especially diesel oil), comprising a step of contacting a heavy distillate oil feedstock with the hydrotreating catalyst according to Claim 1 under hydrodesulfurization conditions.