## CLAIMS

1. A rubber compounding oil having:

a total aromatic content of 50 mass% or greater according to ASTM D 2007 or ASTM D 2549, a flash point of 250°C or higher, a difference of at least 45°C between the pour point and glass transition point;

a benzo(a)pyrene content of no greater than 1 ppm by mass; and

a total content of the following indicated aromatic compounds 1) to 8) of no greater than 10 ppm by mass.

1) Benzo(a)pyrene (BaP)

2) Benzo(e)pyrene (BeP)

3) Benzo(a)anthracene (BaA)

4) Chrysene (CHR)

5) Benzo(b)fluoranthene (BbFA)

6) Benzo(j)fluoranthene (BjFA)

7) Benzo(k)fluoranthene (BkFA)

8) Dibenzo(a,h)anthracene (DBAhA)

2. The rubber compounding oil according to claim 1, which comprises at least an aromatic compound-containing base oil (b), among;

an aromatic compound-containing base oil (a) containing a raffinate obtained by separating a vacuum distillation fraction of atmospheric distillation residue oil from crude oil by a solvent extraction step, or a refined oil product thereof, and having a 40°C dynamic viscosity of 60-600 $mm^2/s$, an aniline point of 70°C or higher, a 10% point of 400-500°C and a 90% point of 500-600°C in GC distillation, a $\%C_A$ of 3-20 according to ASTM D 3238 and a glass

transition point of no higher than -30°C, and

an aromatic compound-containing base oil (b) containing an extract obtained by separating the vacuum distillation fraction of atmospheric distillation residue oil by a solvent extraction step, or a refined oil product thereof, and having a 40°C dynamic viscosity of 200 $mm^2/s$ or greater, an aniline point of no higher than 90°C, a 15°C density of 0.94 $g/cm^3$ or greater, and a total aromatic content of 30 mass% or greater according to ASTM D 2549,

wherein the content of the aromatic compound-containing base oil (a) is no greater than 95 mass% and the content of the aromatic compound-containing base oil (b) is 5 mass% or greater.

3. The rubber compounding oil according to claim 2, wherein the solvent extraction step includes;

a first solvent extraction step in which the vacuum distillation fraction is contacted with a polar solvent in a first extraction column having a bottom temperature of 30-90°C and a top temperature that is higher than the bottom temperature, to obtain a first raffinate and a first extract, and

a second solvent extraction step in which the first raffinate is contacted with a polar solvent in a second extraction column having a bottom temperature and top temperature that are each at least 10°C higher than those of the first extraction column, to obtain a second raffinate and a second extract,

wherein the aromatic compound-containing base oil (b) is the second extract or a refined oil product thereof.

4. A method for producing a rubber compounding oil, which comprises

a blending step of blending;

an aromatic compound-containing base oil (a) containing a raffinate obtained by separating a vacuum distillation fraction of atmospheric distillation residue oil from crude oil by a solvent extraction step, or a refined oil product thereof, and having a 40°C dynamic viscosity of 60-600 $mm^2/s$, an aniline point of 70°C or higher, a 10% point of 400-500°C and a 90% point of 500-600°C in GC distillation, a $\%C_A$ of 3-20 according to ASTM D 3238 and a glass transition point of no higher than -30°C, and

an aromatic compound-containing base oil (b) containing an extract obtained by separating the vacuum distillation fraction of atmospheric distillation residue oil by a solvent extraction step, or a refined oil product thereof, and having a 40°C dynamic viscosity of 200 $mm^2/s$ or greater, an aniline point of no higher than 90°C, a 15°C density of 0.94 $g/cm^3$ or greater, and a total aromatic content of 30 mass% or greater according to ASTM D 2549,

wherein the rubber compounding oil has the total aromatic content of 50 mass% or greater according to ASTM D 2007 or ASTM D 2549, the flash point of 250°C or higher, the difference between the pour point and the glass transition point of at least 45°C, the benzo(a)pyrene content of no greater than 1 ppm by mass and the total content of the following indicated aromatic compounds 1) to 8) of no greater than 10 ppm by mass, and

wherein the content of the aromatic compound-containing base oil (a) in the rubber compounding oil is greater than 0 and no greater than 95 mass% and the content of the aromatic compound-containing

base oil (b) in the rubber compounding oil is 5 mass% or greater and less than 100 mass%.

1) Benzo(a)pyrene (BaP)

2) Benzo(e)pyrene (BeP)

3) Benzo(a)anthracene (BaA)

4) Chrysene (CHR)

5) Benzo(b)fluoranthene (BbFA)

6) Benzo(j)fluoranthene (BjFA)

7) Benzo(k)fluoranthene (BkFA)

8) Dibenzo(a,h)anthracene (DBAhA)

5. A method for producing an aromatic compound-containing base oil comprising:

a first solvent extraction step in which a vacuum distillation fraction of atmospheric distillation residue oil from crude oil is contacted with a polar solvent in a first extraction column having a bottom temperature of 30-90°C and a top temperature that is higher than the bottom temperature, to obtain a first raffinate and a first extract; and

a second solvent extraction step in which the first raffinate is contacted with a polar solvent in a second extraction column having a bottom temperature and top temperature that are each at least 10°C higher than those of the first extraction column, to obtain a second raffinate and a second extract having a 15°C density of 0.94 g/cm$^3$ or higher and a total aromatic content of 30 mass% or greater,

wherein the aromatic compound-containing base oil includes at least a portion of the second extract and the second raffinate or a refined oil product thereof, and has a total aromatic content of 30 mass% or

greater.

6. The method for producing the aromatic compound-containing base oil according to claim 5, comprising a base oil preparation step in which the second raffinate is subjected to refining treatment including dewaxing treatment to obtain the refined oil product after the second solvent extraction step,

wherein the aromatic compound-containing base oil includes the refined oil product and has a pour point of no higher than -5°C, an aniline point of 90°C or higher, a viscosity index of 90 or greater and a flash point of 250°C or higher.

7. The method for producing the aromatic compound-containing base oil according to claim 5,

wherein the aromatic compound-containing base oil includes at least a portion of the second extract, and has a 40°C dynamic viscosity of 200 $mm^2/s$ or greater, a flash point of 250°C or higher, a pour point of no higher than 30°C, an aniline point of no higher than 90°C, a glass transition point of no higher than -30°C and a difference of at least 50°C between the pour point and the glass transition point.

8. The method for producing the aromatic compound-containing base oil according to claim 5,

wherein the aromatic compound-containing base oil has the benzo(a)pyrene content of no greater than 1 ppm by mass, and the total content of the following indicated aromatic compounds 1) to 8) of no greater than 10 ppm by mass.

1) Benzo(a)pyrene (BaP)

2) Benzo(e)pyrene (BeP)

3) Benzo(a)anthracene (BaA)

4) Chrysene (CHR)

5) Benzo(b)fluoranthene (BbFA)

6) Benzo(j)fluoranthene (BjFA)

7) Benzo(k)fluoranthene (BkFA)

8) Dibenzo(a,h)anthracene (DBAhA)

9. An aromatic compound-containing base oil obtainable by the production method according to any one of claims 5 to 8.

10. A rubber compounding oil comprising the aromatic compound-containing base oil according to claim 9.

## CLAIMS

1. A rubber compounding oil comprising

a component (a) that consists of an aromatic compound-containing base oil containing a raffinate obtained by separating a vacuum distillation fraction of atmospheric distillation residue oil from crude oil by a polar solvent extraction step, or a refined oil product thereof, and having a $\%C_A$ of 3-20 according to ASTM D 3238 and a pour point of no higher than -10°C; and

a component (b) that consists of an aromatic compound-containing base oil containing an extract obtained by separating the vacuum distillation fraction of atmospheric distillation residue oil by a polar solvent extraction step, or a refined oil product thereof, and having a $\%C_A$ of 25-45 according to ASTM D 3238 and a 15°C density of 0.94 $g/cm^3$ or greater, and

wherein the content of the component (a) in the rubber compounding oil is no greater than 95 mass% and the content of the component (b) in the rubber compounding oil is 5 mass% or greater, and

wherein the rubber compounding oil has

a total aromatic content of 50 mass% or greater according to ASTM D 2007 or ASTM D 2549, a flash point of 250°C or higher, a difference of at least 45°C between the pour point and glass transition point,

a benzo(a)pyrene content of no greater than 1 ppm by mass; and

a total content of the following indicated aromatic compounds 1) to 8) of no greater than 10 ppm by mass.

1) Benzo(a)pyrene (BaP)

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7) Benzo(k)fluoranthene (BkFA)

8) Dibenzo(a,h)anthracene (DBAhA)

2. The rubber compounding oil according to claim 1,

wherein the aromatic compound-containing base oil of the component (a) has a 40°C dynamic viscosity of 60-600 $mm^2/s$, an aniline point of 70°C or higher, a 10% point of 400-500°C and a 90% point of 500-600°C in GC distillation and a glass transition point of no higher than -30°C, and

wherein the aromatic compound-containing base oil of the component (b) has a 40°C dynamic viscosity of 200 $mm^2/s$ or greater, an aniline point of no higher than 90°C, and a total aromatic content of 30 mass% or greater according to ASTM D 2549.

3. The rubber compounding oil according to claim 1 or 2, wherein the polar solvent extraction step includes;

a first polar solvent extraction step in which the vacuum distillation fraction is contacted with a polar solvent in a first extraction column having a bottom temperature of 50-70°C and a top temperature of 80-100°C, to obtain a first raffinate and a first extract, and

a second polar solvent extraction step in which the first raffinate is contacted with a polar solvent in a second extraction column having a bottom temperature and top temperature that are each at least 10°C higher than those of the first extraction column, to obtain a second raffinate and a second extract,

wherein the component (b) is the second extract or a refined oil product thereof.

4. The rubber compounding oil according to any one of claims 1 to 3, wherein the component (b) comprises

an aromatic compound-containing base oil (b1) having a 40°C dynamic viscosity of 200 $mm^2/s$ or greater and less than 500 $mm^2/s$ and a glass transition point of between -60 and -40°C, and

an aromatic compound-containing base oil (b2) having a 40°C dynamic viscosity of 500 $mm^2/s$ or greater and a glass transition point of between -50 and -30°C.

5. The rubber compounding oil according to any one of claims 1 to 4, wherein the component (a) has a 40°C dynamic viscosity of 120-250 $mm^2/s$.

6. A method for producing a rubber compounding oil, which comprises a blending step of blending;

a component (a) that consists of an aromatic compound-containing base oil containing a raffinate obtained by separating a vacuum distillation fraction of atmospheric distillation residue oil from

crude oil by a polar solvent extraction step, or a refined oil product thereof, and having a 40°C dynamic viscosity of 60-600 $mm^2/s$, an aniline point of 70°C or higher, a 10% point of 400-500°C and a 90% point of 500-600°C in GC distillation, a $\%C_A$ of 3-20 according to ASTM D 3238 ,a pour point of no higher than -10°C and a glass transition point of no higher than -30°C, and

a component (b) that consists of an aromatic compound-containing base oil containing an extract obtained by separating the vacuum distillation fraction of atmospheric distillation residue oil by a polar solvent extraction step, or a refined oil product thereof, and having a 40°C dynamic viscosity of 200 $mm^2/s$ or greater, an aniline point of no higher than 90°C, a $\%C_A$ of 25-45 according to ASTM D 3238, a 15°C density of 0.94 $g/cm^3$ or greater, and a total aromatic content of 30 mass% or greater according to ASTM D 2549,

wherein the rubber compounding oil has the total aromatic content of 50 mass% or greater according to ASTM D 2007 or ASTM D 2549, the flash point of 250°C or higher, the difference between the pour point and the glass transition point of at least 45°C, the benzo(a)pyrene content of no greater than 1 ppm by mass and the total content of the following indicated aromatic compounds 1) to 8) of no greater than 10 ppm by mass, and

wherein the content of the component (a) in the rubber compounding oil is greater than 0 and no greater than 95 mass% and the content of the component (b) in the rubber compounding oil is 5 mass% or greater and less than 100 mass%.

1) Benzo(a)pyrene (BaP)

2) Benzo(e)pyrene (BeP)

3) Benzo(a)anthracene (BaA)

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