Claims

1. A water-soluble metal-working oil agent, characterized by comprising a component A and a component B, wherein:

the component A is a mineral oil which has a characteristic temperature, as measured in accordance with JIS K2242, of 570°C or higher, and

the component B is at least one condensed fatty acid which is selected from a condensed fatty acid (1), produced through dehydration condensation of a hydroxycarboxylic acid, and a condensed fatty acid (2), produced through dehydration condensation of an alcoholic hydroxyl group of the condensed fatty acid (1) with a monovalent carboxylic acid, which has a characteristic temperature, as measured in accordance with JIS K2242, of 650°C or higher.

2. A water-soluble metal-working oil agent according to claim 1, wherein the component A has a kinematic viscosity, as determined at 40°C in accordance with JIS K2283, of 300 mm^2/s or higher, and a flash point of 220°C or higher.

3. A water-soluble metal-working oil according to claim 1 or 2, wherein the component A is contained in the water-soluble metal-working oil agent in an amount of 10 mass% or more with respect to the entire amount of the agent.

4. A water-soluble metal-working oil according to any of claims 1 to 3, wherein the component A is a naphthene base mineral oil.

5. A water-soluble metal-working oil according to any of claims 1 to 4, wherein the hydroxycarboxylic acid is ricinoleic acid.

6. A water-soluble metal-working oil according to any of claims 1 to 5, wherein the component B has an acid value of 60 mgKOH/g or less and a hydroxyl value of 50 mgKOH/g or less.

7. A water-soluble metal-working oil according to any of claims 1 to 6, wherein the component B is contained in the water-soluble metal-working oil agent in an amount of 7.5 mass% or more with respect to the entire amount of the agent.

8. A water-soluble metal-working oil according to any of claims 1 to 7, which further contains a carboxylic acid as a component C.

9. A water-soluble metal-working oil according to claim 8, wherein the carboxylic acid is contained in the water-soluble metal-working oil agent in an amount of 2 mass% or more with respect to the entire amount of the agent.

10. A water-soluble metal-working oil according to any of claims 1 to 9, which further contains an amine compound or an alkali metal compound as a component D.

11. A water-soluble metal-working oil according to claim 10, wherein the component D is contained in such a neutralization equivalent that at least the component B and component C are neutralized to cancel out the sum of the acid values thereof.

12. A water-soluble metal-working oil according to

claim 10 or 11, wherein the amine compound is at least one of an alkanolamine and an alkylamine.

13. A water-soluble metal-working oil according to any of claims 1 to 12, which further contains water.

14. A metal-working liquid comprising a water-soluble metal-working oil agent as recited in any of claims 1 to 13, the agent being diluted by water.

15. A metal-working method comprising working a metal workpiece by use of a water-soluble metal-working oil agent as recited in any of claims 1 to 13.

16. A metal-working method comprising working a metal workpiece by use of a metal-working liquid as recited in claim 14.

17. A metal-working method according to claim 15 or 16, wherein the workpiece is at least one species selected from the group consisting of titanium, titanium alloy, nickel alloy, niobium alloy, tantalum alloy, molybdenum alloy, tungsten alloy, stainless steel, and high-manganese steel.

18. A metal-working method according to any of claims 15 to 17, which is intermittent cutting.

Claims

1. A water-soluble metal-working oil agent, characterized by comprising a component A and a component B, wherein:

the component A is a mineral oil which has a characteristic temperature, as measured in accordance with JIS K2242, of 570°C or higher, and

the component B is at least one condensed fatty acid which is selected from a condensed fatty acid (1), produced through dehydration condensation of a hydroxycarboxylic acid, and a condensed fatty acid (2), produced through dehydration condensation of an alcoholic hydroxyl group of the condensed fatty acid (1) with a monovalent carboxylic acid, which has a characteristic temperature, as measured in accordance with JIS K2242, of 650°C or higher,

and further characterized by comprising a carboxylic acid as a component C, and

an amine compound or an alkali metal compound as a component D,

and wherein the component D is contained in such a neutralization equivalent that at least the component B and component C are neutralized to cancel out the sum of the acid values thereof.

2. A water-soluble metal-working oil agent according to claim 1, wherein the component A has a kinematic viscosity,

as determined at 40°C in accordance with JIS K2283, of 300 mm^2/s or higher, and a flash point of 220°C or higher.

3. A water-soluble metal-working oil according to claim 1 or 2, wherein the component A is contained in the water-soluble metal-working oil agent in an amount of 10 mass% or more with respect to the entire amount of the agent.

4. A water-soluble metal-working oil according to any of claims 1 to 3, wherein the component A is a naphthene base mineral oil.

5. A water-soluble metal-working oil according to any of claims 1 to 4, wherein the hydroxycarboxylic acid is ricinoleic acid.

6. A water-soluble metal-working oil according to any of claims 1 to 5, wherein the component B has an acid value of 60 mgKOH/g or less and a hydroxyl value of 50 mgKOH/g or less.

7. A water-soluble metal-working oil according to any of claims 1 to 6, wherein the component B is contained in the water-soluble metal-working oil agent in an amount of 7.5 mass% or more with respect to the entire amount of the agent.

8. A water-soluble metal-working oil according to claim

1, wherein the carboxylic acid is contained in the water-soluble metal-working oil agent in an amount of 2 mass% or more with respect to the entire amount of the agent.

9. A water-soluble metal-working oil according to claim 1, wherein the amine compound is at least one of an alkanolamine and an alkylamine.

10. A water-soluble metal-working oil according to any of claims 1 to 9, which further contains water.

11. A metal-working liquid comprising a water-soluble metal-working oil agent as recited in any of claims 1 to 10, the agent being diluted by water.

12. A metal-working method comprising working a metal workpiece by use of a water-soluble metal-working oil agent as recited in any of claims 1 to 10.

13. A metal-working method comprising working a metal workpiece by use of a metal-working liquid as recited in claim 11.

14. A metal-working method according to claim 12 or 13, wherein the workpiece is at least one species selected from the group consisting of titanium, titanium alloy, nickel alloy, niobium alloy, tantalum alloy, molybdenum alloy,

tungsten alloy, stainless steel, and high-manganese steel.

15. A metal-working method according to any of claims 12 to 14, which is intermittent cutting.