CLAIMS

1. A marine fuel oil pretreatment desulfurization system using a pretreatment desulfurization agent, the system comprising:

a desulfurization agent storage tank configured to store a liquid-phase pretreatment desulfurization agent; and

a metering pump for supplying the desulfurization agent from the desulfurization agent storage tank to a fuel supply line through which marine fuel oil is supplied to a marine engine,

wherein the fuel supply line is equipped with a line mixer, and the metering pump introduces the pretreatment desulfurization agent into the marine fuel oil in a state in which the metering pump is connected to the line mixer,

wherein the pretreatment desulfurization agent is mixed with the marine fuel oil in a ratio of 3.5% to 6.0% by weight with respect to 100% by weight of the marine fuel oil and the resulting mixture is supplied to the marine engine so that sulfur oxides are adsorbed and removed during combustion of the resulting mixture, and

wherein the pretreatment desulfurization agent comprises: (a) at least one oxide selected from the group consisting of SiO_2, Al_2O_3, Fe_2O_3, TiO_2, MgO, MnO, CaO, Na_2O, K_2O, and P_2O_3; (b) at least one metal selected from the group consisting of Li, Cr, Co, Ni, Cu, Zn, Ga, Sr, Cd, and Pb; and (c) at least one liquid composition selected from the group consisting of sodium tetraborate ($Na_2B_4O_7 \cdot 10H_2O$), sodium hydroxide (NaOH), sodium silicate (Na_2SiO_3), and hydrogen peroxide (H_2O_2).

2. The system according to claim 1, wherein the oxide comprises 15 to 90 parts by weight of SiO_2, 15 to 100 parts by weight of Al_2O_3, 10 to 50 parts by weight of Fe_2O_3, 5 to 15 parts by weight of TiO_2, 20 to 150 parts by weight of MgO, 10 to 20 parts by weight of MnO, and 20 to 200 parts by weight of CaO, 15 to 45 parts by weight of Na_2O, 20 to 50 parts by weight of K_2O, and 5 to 20 parts by weight of P_2O_3, and

the metal comprises 0.0035 to 0.009 parts by weight of Li, 0.005 to 0.01 parts by weight of Cr, 0.001 to 0.005 parts by weight of Co, 0.006 to 0.015 parts by weight of Ni, 0.018 to 0.03 parts by weight of Cu, 0.035 to 0.05 parts by weight of Zn, 0.04 to 0.08 parts by weight of Ga, 0.02 to 0.05 parts by weight of Sr, 0.002 to 0.01 parts by weight of Cd, and 0.003 to 0.005 parts by weight

of Pb.

3. The system according to claim 1, wherein the oxide and metal have a particle size of 1 to 2 μm and a specific gravity of 2.5 to 3.0.

4. The system according to claim 1, wherein the sodium tetraborate ($Na_2B_4O_7 \cdot 10H_2O$) is contained in an amount of 20 to 130 parts by weight, the sodium hydroxide (NaOH) is contained in an amount of 15 to 120 parts by weight, the sodium silicate (Na_2SiO_3) is contained in an amount of 50 to 250 parts by weight, and hydrogen peroxide (H_2O_2) is contained in an amount of 10 to 50 parts by weight.

5. The system according to claim 1, wherein the pretreatment desulfurization agent is configured such that the oxide, the metal, and the liquid composition form a metal chelate compound.

6. The system according to claim 1, wherein the pretreatment desulfurization agent has a sulfur oxide (SO_x) adsorption effect that is activated at temperatures in a range of 400ºC to 1200ºC.

7. The system according to claim 1, wherein the pretreatment desulfurization agent is mixed in a ratio of 6% by weight with respect to 100% by weight of the marine fuel oil.

8. The system according to claim 1, further comprising a flow meter, a check valve, and a pressure gauge which are disposed between the line mixer and the metering pump.

9. The system according to claim 1, wherein the marine fuel oil is any heavy oil among heavy oils including bunker-A oil, bunker-B oil, and bunker-C oil, or any light oil among light oils including MGO, MDO, and DDO.