CLAIMS

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

preparing a pretreatment desulfurization agent comprising (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); and

feeding the pretreatment desulfurization agent, in an amount ranging from 3.5 wt.% to 6.0 wt.% relative to 100 wt.% marine fuel oil, to a marine engine fuel supply line that transports marine fuel oil to a marine engine so that a fluid mixture containing the marine fuel oil and the pretreatment desulfurization agent is supplied to the marine engine, thereby adsorbing and removing sulfur oxides during combustion of the fluid mixture;

wherein the marine fuel oil and the pretreatment desulfurization agent are mixed and applied to the marine engine through line mixing.

2. The method 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, 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 method 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 method 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 the hydrogen peroxide (H_2O_2) is contained in an amount of 10 to 50 parts by weight.

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

8. The method according to claim 1, wherein the marine fuel oil is heavy oil such as bunker-A oil, bunker-B oil, or bunker-C oil, or light oil such as MGO, MDO, or DDO.