CLAIMS

1. A chemical treatment solution for coating a zinc-based plated steel sheet having a zinc-based plating layer containing 0.1 to 22.0 mass % of aluminum, the chemical treatment solution comprising:

a water-soluble molybdate;

an oxoanion of vanadium having a valence of 5;

an amine or ammonia;

a hydracid salt, an ammonium salt, an alkaline metal salt or an alkaline earth metal salt of group 4 element; and

a phosphate compound,

wherein:

a molar ratio of molybdenum to vanadium in the chemical treatment solution is 0.4 to 5.5,

a molar ratio of the amine or ammonia to the vanadium in the chemical treatment solution is 0.3 or more,

a content of a hydrophilic resin in the chemical treatment solution is at most 100 mass % based on a total amount of the vanadium and the molybdenum in the chemical treatment solution,

a total content of fluorine derived from a fluorine ion or a fluorometal ion in the chemical treatment solution is at most 30 mass % based on the total amount of the vanadium and the molybdenum in the chemical treatment solution, and

a content of silicon derived from a silanol group in the chemical treatment solution is at most 50 mass % based on the total amount of the vanadium and the molybdenum in the chemical treatment solution.

2. The chemical treatment solution according to claim 1, wherein the amine has a molecular weight of 80 or less.