"includes," “contains,” etc. are considered open-ended and include any element, step, or ingredient not explicitly listed. The phrase "consists essentially of" is meant to include any expressly listed element, step, or ingredient and any additional elements, steps, or ingredients that do not materially affect the basic and novel aspects of the invention. The present disclosure also contemplates that any composition described using the terms, "comprises," "includes," “contains,” is also to be interpreted as including a disclosure of the same composition "consisting essentially of" or “consisting of” the specifically listed components thereof.

BRIEF DESCRIPTION OF DRAWINGS

[00017] FIG. 1 is a ^{31}P NMR spectra of Comparative and Inventive hydraulic fluids including alkylated diisopropyl dithiophosphate antiwear additives of the present disclosure;

[00018] FIGS. 2 and 3 are plots of copper corrosion for two different treat rates of alkylated diisopropyl dithiophosphate antiwear additives in Comparative and Inventive hydraulic fluids;

[00019] FIG 4 is an image representing the comparative reaction product between an organic hydroxy compound and phosphorus pentasulfide; and

[00020] FIG. 5 is an image representing a condensate obtained from the distillation of reaction products between the organic hydroxy compound and the phosphorus pentasulfide.

DETAILED DESCRIPTION

[00021] Disclosed herein are improved ashless antiwear additives and lubricating compositions including such improved ashless antiwear additives providing good antiwear performance with improved copper corrosion at the same time. In one embodiment, the ashless antiwear additives are oil-soluble phosphorus antiwear additives. In one approach, the lubricating compositions herein include at least one or more base oils of lubricating viscosity and a novel ashless dithiophosphate ester antiwear additive. In one aspect, the oil-soluble phosphorus antiwear additives herein are prepared by (a) reacting an organic hydroxy compound with phosphorus pentasulfide to form a reaction product; (b) evaporating and/or distilling the reaction product and recovering a condensate therefrom to provide a distilled reaction product including a diester of a dithiophosphoric acid; and (c) reacting the condensate with an organic compound, such as an unsaturated ester of a carboxylic acid, to form the improved oil-soluble phosphorus antiwear additive. The improved oil-soluble phosphorus antiwear additives of the