

Multi-Functional Lubricant Additives Comprising Ionic Liquids Containing Symmetric Quaternary Phosphonium Cations and Phosphate or Phosphinate Anions

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Technology Summary

A lubricant additive is an ionic liquid phosphonium salt. The phosphonium cation of the ionic liquid is in a symmetric quaternary structure ($[PR_4]^+$) having four hydrocarbyl groups with the same number (≥ 4) of carbon atoms. The anion of the ionic liquid is either phosphate $[P(O)_2(OR)_2]^-$ or phosphinate $[P(O)_2(R)_2]^-$, wherein R is independently hydrocarbyl group having at least four carbon atoms. The ionic liquid may be used as an ashless additive in lubricating oils, such as anti-wear, friction modifier, and/or corrosion inhibitor. Potential applications include internal combustion engines, gears, bearings, axles, hydraulic systems, metal cutting and forming, and other manufacturing processes.

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