

# THE CHEMICAL STATES AND COMPOUNDS OF LUBE OIL PHOSPHOROUS IN DIESEL EXHAUST

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## ABSTRACT

Phosphorous in diesel exhaust is derived from the ZDDP additive in lube oil used for wear control. Phosphorous emitted in the engine exhaust can react with an aftertreatment catalyst and cause loss of performance through masking or chemical reaction. It appears that there is a minimum level of ZDDP needed for engine durability. One of the ways of reducing the effects of the resulting phosphorous on catalysts might be to alter the chemical state of the phosphorous to a less damaging form. And, one of the first requirements of altering the chemical state of

phosphorous is to be able to measure the chemical state and compounds in diesel exhaust. In this preliminary study, the phosphorous compounds in diesel exhaust were measured by a variety of analytical techniques and correlated to such variables as ZDDP concentration in the oil, exhaust temperature, and fuel doping with ZDDP. These analytical techniques will then be applied to lube oil formulation studies and to catalyst durability studies in order to reduce or eliminate phosphorous poisoning in a catalyst.