

DETERMINING CONCENTRATION BY ALKALINITY IN METALWORKING FLUID EMULSIONS

WHAT IS ALKALINITY IN A METALWORKING FLUID EMULSION?

In condition monitoring, alkalinity is a common concentration control for semi-synthetic and synthetic metalworking fluid emulsions. An emulsion's alkalinity is a measure of product concentration based on the amount of alkaline components present. Common alkaline components in a Castrol Industrial metalworking fluid may include amines and corrosion inhibitors.

HOW IS ALKALINITY MEASURED?

A metalworking fluid emulsion's alkalinity is commonly measured by a manual titration or with the use of an automatic titrator. Acid is added to the emulsion to quickly and accurately titrate the sample to its endpoint. The volume of acid used in the titration is recorded and a product-dependent factor applied. This results in the calculation of an emulsion's concentration by alkalinity.

WHY IS MEASURING ALKALINITY IMPORTANT IN CONDITION MONITORING?

Measuring an emulsion's concentration by alkalinity is important as it is a primary measure of concentration in a metalworking fluid sump. In addition, alkaline components in an emulsion commonly function to buffer the fluid's pH, provide bioresistance and prevent corrosion. In general, concentration by alkalinity should trend with existing concentration control parameters in Castrol's used oil analysis program.

A metalworking fluid sump with lean concentration by alkalinity may experience bacteria growth due to reduced bioresistance, formed rust on machined surfaces due to reduced corrosion protection, and other machining complications. Typically, when concentration by alkalinity trends consistently lower than the sump's desired concentration range, fresh product concentrate may be added to increase sump concentration.

Conversely, a metalworking fluid sump with rich concentration by alkalinity may experience residue formation, foam generation, and ultimately result in excessive product usage. In addition, an unexpected large increase in a sump's concentration by alkalinity may indicate the presence of contamination. Common undesired contaminants that may contribute to a large increase in alkalinity include alkaline cleaners and other metalworking fluid emulsions. Typically, when concentration by alkalinity trends consistently higher than the sump's desired concentration range, water may be added to lower the sump's alkalinity. Measuring an emulsion's concentration by alkalinity supports regular sump maintenance and helps Castrol's customers achieve full product performance of their metalworking fluid.

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