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Additives for Grease Formulations

Ivanhoe Industries offers a wide variety of additives for use in lubricating greases. As a stocking distributor, Ivanhoe Industries can supply mixed shipments of products to the formulator, providing convenient inventory management and savings on freight. We offer rapid response, flexibility and competitive pricing so that our customers can be successful. The company's headquarters and main warehouse is in Tullytown PA, near to Philadelphia with other stocking locations available nationwide.

<u>Sebacic Acid</u> – Ivanhoe has been a leading supplier of sebacic acid in North America for over 20 years. Sebacic acid is used as a cost-effective but high-performance diacid thickener in lithium complex greases.

<u>Sebacate Esters</u> – Ivanhoe offers a full line of C_1 - C_8 sebacate esters. These are used as liquid sebacic acid equivalents by some grease producers. The ease of handling and process improvement provided by the use of a liquid raw material has to be balanced by the need to contain the alcohol liberated during soap formation.

<u>Azelaic Acid</u> – Ivanhoe's technical grade of azelaic acid has been widely used as a thickener in lithium complex greases for many years. The technical grade product offers the right balance of quality and cost-effectiveness.

<u>Benzoic Acid</u> – Benzoic acid is the preferred acid used in aluminum complex greases. Ivanhoe offers a high purity technical-grade product that resists caking.

<u>IvanGuard® Disodium Sebacate</u> – Disodium sebacate is an effective corrosion inhibitor in greases when used at low levels. It is approved for use as an additive in certain lubricants and greases for incidental food contact per CFR 21.178.3570. A super-fine ($<10\mu$) grade is available. Both the granular and micronized grades are HX-1 approved.

<u>IvanGuard® Triazoles</u> – Benzotriazole and tolyltriazole have been the workhorse corrosion inhibitors for yellow metals for many years. Ivanhoe offers both products under the IvanGuard® tradename.

Adipic Acid – Adipic acid is used as a low-cost thickening agent for lithium complex greases.

<u>Preformed Thickeners</u> –.Ivanhoe offers the preformed lithium, calcium and aluminum soaps and a preformed polyurea thickener. The use of preformed thickeners improves batch-to-batch consistency and reduces cycle times for hard to produce formulations and those sensitive to stoichiometry. Preformed thickeners allow the one-step production of high performance greases in ester, vegetable oil, silicone and polyalkylene glycol basestocks.

<u>Functional Products</u> – Ivanhoe represents the line of tackifiers, viscosity modifiers, anti-oxidants and other grease additives produced by Functional Products of Macedonia OH. These products can be used to improve performance in water spray-off, roll-stability, low temperature mobility, extreme pressure performance and dropping point. The full product line can be found at www.functionalproducts.com.

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