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USE OF BYPRODUCTS IN SUSPENSIONS

Prepared by

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Instructors

H. L. Kimbrough, Chemical Engineer
and

E. B. Wright, Jr., Chemical Engineer
Field Engineering Staff
Division of Agricultural Development
National Fertilizer Development Center

Use of Byproducts in Suspensions

TVA has helped several chemical firms develop uses for byproducts or chemical waste products in the fertilizer industry. Many of these products contain usable quantities of plant food including primary and secondary nutrients and micronutrients.

Spent phosphoric acid is a waste product of aluminum fabricators who use phosphoric acid to brighten aluminum products. Large quantities of spent phosphoric acid have been used by the fertilizer industry to produce mixed liquids containing phosphate. When this acid is neutralized by ammonia to 8-24-0 grade, the aluminum precipitates unless it is sequestered with polyphosphates. Further ammoniation to a pH above about 8.5 causes the aluminum to redissolve producing a clear solution having a grade of about 10-22-0. Although this product has a strong odor of ammonia, the product can be applied under the soil.

Use of spent sulfuric acid is increasing in areas where it is available. Manufacturers face a disposal problem with the material and agricultural application may be the most efficient way to deal with it. Because of the low concentration of H_2SO_4 , spent acids are quite corrosive and transportation is regulated. Direct ammoniation results in the precipitation of large crystals of iron salts that could easily plug spray nozzles. Adding urea directly to the acid before ammoniation or immediately following ammoniation helps to keep these large crystals from forming. Also, the heat of reaction with ammonia helps to dissolve urea. A 22-0-0-1S grade having a pH of about 5.5 was prepared in this manner from spent acid, urea, ammonia, and fluid clay (2% total clay).

A 23-0-0-4.9S grade was produced from 30 percent sulfuric acid by mixing equal quantities of urea and acid. No suspending clay was required since the acid was clear and relatively clean. The urea-sulfuric acid adduct, although low in pH (near 1), is considerably less corrosive and dangerous to use than dilute sulfuric acid.

Spent acid is available from galvanizing companies, lead-acid battery salvagers, and others. These companies will usually provide chemical analyses of the material and are generally cooperative. These acids are good sources of sulfur although the final concentration may be low.

Galvanizers also use a zinc-ammonium chloride solution as a final conditioner for steel before it is dipped in molten zinc. After it becomes exhausted, this solution is available as a byproduct and is a good source of zinc. The byproduct usually contains from 15 to 20 percent zinc as zinc chloride. Some nitrogen is also present. Handling problems have been bottom of storage tanks. This sediment can be suspended with fluid clay. Fluid clay is generally preferred because it is predispersed and gels immediately in the presence of fertilizer salts. Dry clay can be difficult to disperse before it gels in these byproduct materials. At low pH values, the clay may over gel into a viscous mass or break down chemically so that the product foams or the clay loses its gelling character.

Care should be taken to assure that the byproducts or waste products do not contain hazardous or toxic materials. Some products contain appreciable quantities of heavy metals. Applying these on a limited acreage or without considerable dilution with other materials could harm the crop or humans.