

TECHNICAL BRIEFS

ENGINEERING DEVELOPMENTS HERE AND
ABROAD DIGESTED FOR BUSY POWER MEN

WATER TREATMENT

Deminceralisation Process, by Daniel J. Saunders, Permutit Co. This paper begins with discussion of a water practically clear and colorless and ready for deminceralization.

Many industrial services find calcium and magnesium salts the most troublesome minerals. Lime and soda methods made up the first hardness-removing treatments. Then about 40 years ago the zeolite cation-exchange process was invented. In this process, sodium-zeolite-treated water contains sodium salts equivalent in amount to chlorides, sulphates and bicarbonates in the original water. Total dissolved solids stay the same as untreated water. In some instances, such a condition is objectionable.

Acid-resistant, carbonaceous, sulphonated coal zeolites became available in 1936. Hydrogen ions replace sodium, calcium and magnesium ions in water under this acid-zeolite treatment. Adding an alkali, such as sodium carbonate or caustic soda, or blending with the proper amounts of sodium-zeolite-softened water neutralizes hydrochloric and sulphuric acids formed by ion exchange. Carbonic acid formed in this same process decomposes into free carbon dioxide, and degasification will remove it. Concentrations of chloride and sulphate in the raw water constitute the limiting factors on just how low total dissolved solids can go with this process.

Deminceralizing by acid-absorbent anion exchangers produces a water of an electrolyte content equivalent to commercially distilled water. This process removes the sulphuric and hydrochloric acids formed in the cation process. Removal of carbonic acid still requires gasification. Fig. 1 shows the usual two steps involved in the acid-absorbent anion exchangers: (1) the conversion of salts to acids (2) the removal of these acids.

Silica removal down to 1-3 ppm can be achieved by pretreatment where turbidity or color in raw water makes such treatment necessary. Ferric hydroxide floc or magnesium hydroxide act as silica absorbents in pretreatment.

For more complete silica removal, two methods are available: (1) Soluble fluorides can be added to water entering a hydrogen cation-exchange unit and later an anion exchanger. (2) Hydrogen-zeolite treated water is passed through a special highly basic anion-exchange resin. Both methods give a water with silica content of only a fraction of a ppm.

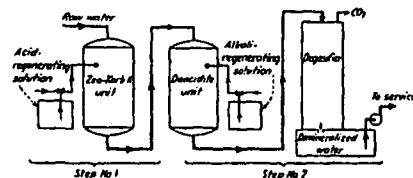
Choice of method involves a complete engineering study including (1) tolerance permissible for various constituents in the treated water (2) operating costs such as equipment, fuel, chemicals and labor. These costs vary with location, water, fuel and chemicals. Fig. 2 helps compute chemical costs. Paper No. 3206-1-48. Available upon request from Permutit Co., 330 W 42nd St, New York 18, N. Y.

Technical and Economical Aspects of Water Purification for Ships, by Klein Schmidt, Arthur D. Little. Water supply aboard ship has been a problem as long as man has sailed the seas. Because steam evaporators for fuel, scale and operating problems the use has not been universal. Many cargo vessels still carry "shore water."

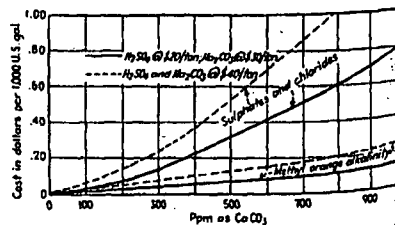
The Klein Schmidt Vapor Compression Distilling unit, originally developed for the Marine Corps for Pacific island service, meets ship service requirements for these cargo vessels. It has five major parts: (1) mechanical power source—turbine, internal-combustion engine or electric motor (2) steam compressor equal to compressing 225 cu ft of steam down to 3 to 5 psig for each gallon of water produced (3) evaporator to boil raw water and condense compressed steam (4) heat exchanger to heat incoming raw water by means of distillate and waste brine from the evaporator (5) heat source for starting the unit, usually waste heat from engine jackets or exhaust.

Auxiliaries under certain conditions include a feed pump to supply and meter water, a condensate pump for water to be delivered any distance to an elevated tank, a steam-pressure gage on compressor discharge; a manometer on the evaporator, a feed-regulating valve, a compressor steam bypass valve, drain and vent cocks, evaporator-cleaning equipment. ASME Paper No. 47-A-136.

(Continued on page 130)



1 Step No. 1 replaces metallic cations by hydrogen (H ion) and converts salts in raw water to acids. Step No. 2 removes acids formed in Step No. 1. The decalcification unit absorbs HCl and H₂SO₄. H₂CO₃ decomposes and degasifier vents CO₂.



2 Demineralizing costs vary with location, water, fuel, chemicals. Chart above shows dollar cost for chemicals.

More than 30 metal gasket designs
Engineered to fit industry's needs

Check your requirements against the
complete Johns-Manville Goetze line

• Whether your need is for a single custom-made metal gasket for a special application—or ten thousand gaskets turned out quickly and inexpensively by modern mass production methods, Goetze facilities are ready to serve you!

Shown here are typical pages from the new J-M Goetze Gasket catalog illustrating a few of more than 30 standard Goetze designs that are available now for high temperature, high pressure service. Goetze Gaskets are fabricated of many metals, in practically any required shape or cross-section. Available sizes

range all the way from tiny gaskets measuring one-eighth of an inch in diameter and weighing but a fraction of an ounce to huge 34-foot gaskets weighing more than a thousand pounds.

You'll find up-to-the-minute engineering data—including a handy reference chart showing construction details of many popular designs—in the complete Johns-Manville Goetze Gasket catalog, just published. Write today, on your company letterhead, for your copy. Address Johns-Manville, Box 290, New York 16, New York.

Johns-Manville Goetze Gaskets