# PROCESSING SPENT DIGESTION LIQUOR FOR LIGNIN-SILICA SEPARATION

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## ABSTRACT

**A novel separation process recently patented allows clean separation of lignins and silica from spent liquor by means of a polymer surfactant treatment followed by acidification. Separated lignins floating to the surface in agglomerated clumps are readily screened from liquor overflowing the treatment tank. Residual liquor with remaining digestion salts and soluble lower molecular weight organic constituents is clear and translucent.**

**The process can be applied to kraft and soda liquors with equal efficiency, but it is particularly applicable to soda digestion liquor usually including dissolved silica extracted from annual vegetable fiber sources. Silica separates with lignins and is occluded in the readily recovered solids floated from the liquor surface, instead of forming an inseparable gelatinous mass seen when spent digestion liquor containing dissolved silica is acidified.**

**The treatment method applied to processing kraft digestion liquor can be considered an alternate recovery system when an overloaded recovery boiler limits fiber production. Capital and operating costs of a treatment facility are quite minimal, and reagents required to carry out the process are routinely procured from established suppliers.**

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# DIGESTION LIQUOR TREATMENT PROCESS

**The process is applicable to soda or kraft pulping liquor. With kraft liquor, acidifying to pH about 3 causes hydrogen sulfide emission. A fume suppression scrubber is required from acidifying vessel vents for operating safety. Process steps are indicated in Figure 1.**

**Return of clarified liquor to digestion is indicated in the proposed scheme of Figure 2. Separated liquor is treated for soluble organics removal and then is recausticized in preparing digestion liquor for return. Water entering from brown-stock washing is removed with wet lignin solids. Silica is separated simultaneously with precipitated lignin agglomerates.**

**Disposition of recovered lignin mass is made according to specific circumstances of the pulping installation. Preferred disposition is to market lignins as a product for various uses (additive to construction materials, etc.). A second preferred use is agricultural soil builders, thus contributing to removal of atmospheric carbon to terrestrial destinations. A third mode of disposition is combustion in a fluidized bed furnace for energy generation, returning silica along with salt carryovers as residues from the bed.**

**Data on silica** in **treated liquor listed with original digestion liquor silica content is given in Table 1. Figure 3 indicates bench-testing results of treating samples of low concentration kraft liquor streams using the separation process. Data on polymer additions as well as acidity (in terms of pH values) are given for three cases of decreasing per cent solids.**

# TABLE 1. SILICA REMOVAL

**SODA PULP DIGESTION WASTE (VALUES IN PARTS PER MILLION Si)**

| | SAMPLE DESCRIPTION | BEFORE TREATMENT | AFTER TREATMENT |
|---|---|---|---|
| 1. | WHEAT STRAW | 144 | 15 |
| 2. | CORN STALK | 520 | 170 |

Technology and process system covered under U.S. Patent No.5,635,024.

FIGURE 1

# DIGESTION LIQUOR TREATMENT PROCESS

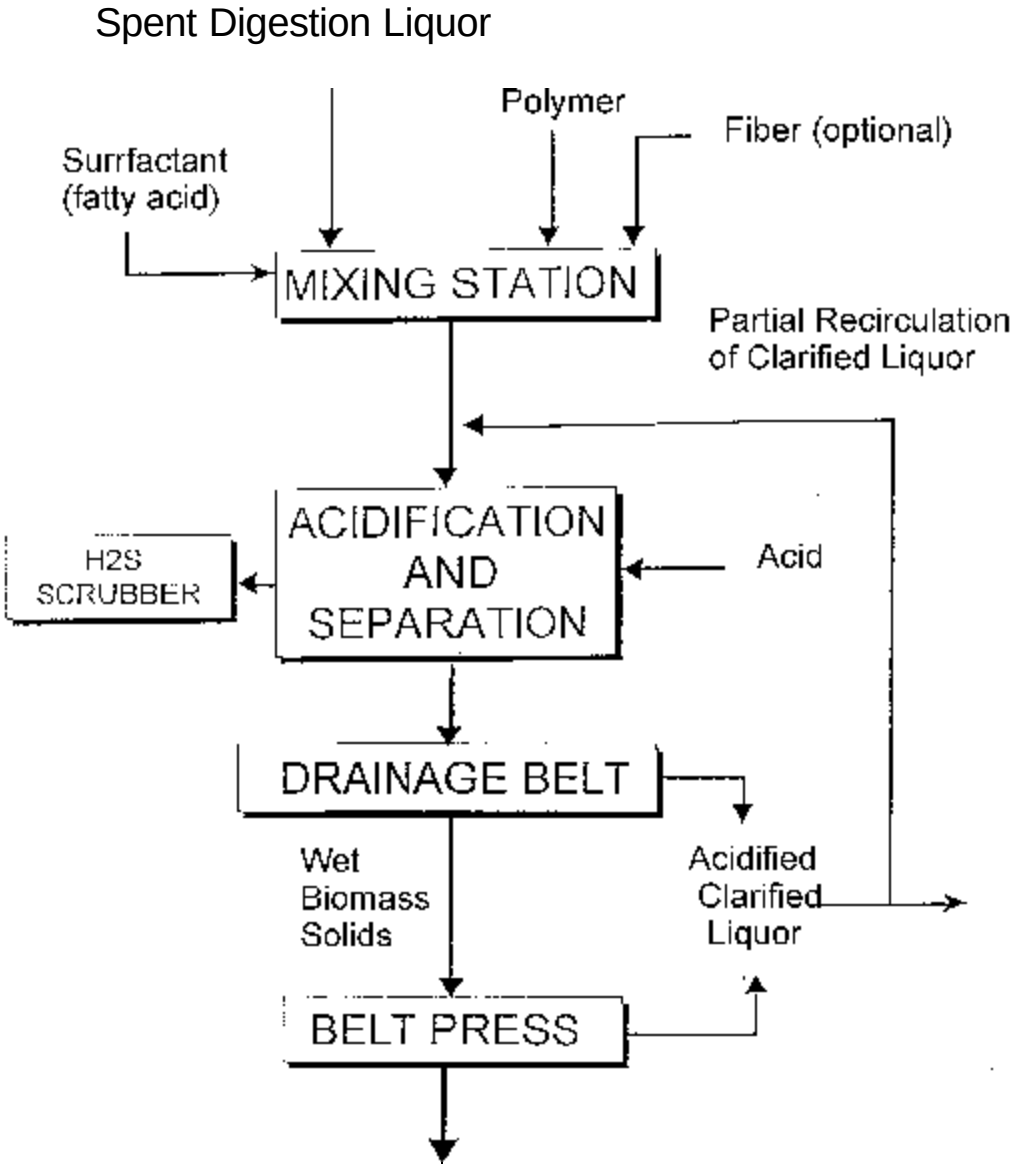

FIGURE *2*

**PROPOSED SODA DIGESTION LIQUOR RECOVERY SCHEM E**

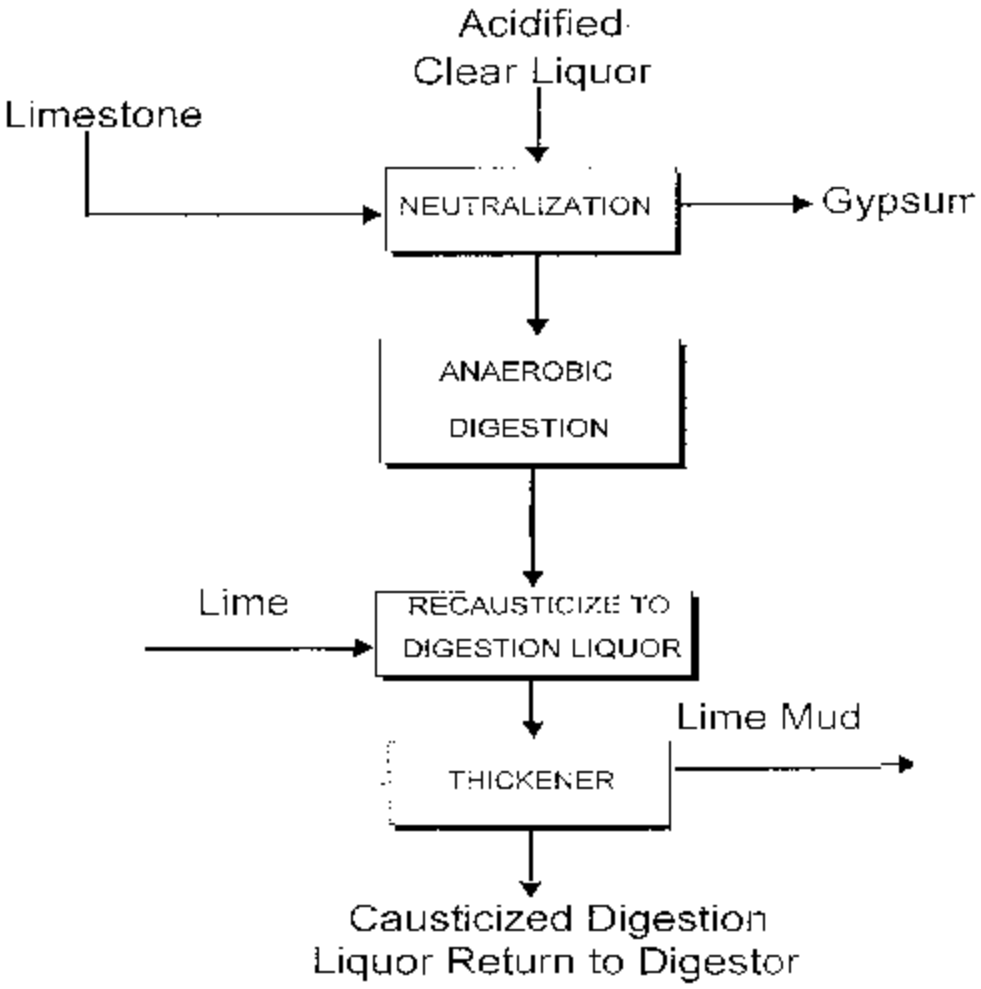

FIGURE 3

# EXAMPLES IN TREATMENT OF DILUTE KRAFT LIQUORS