

Chapter III

Literature Review

The formulation of adequate sodium tripolyphosphate built liquid detergent having a satisfactory laundering performance was researched and published in the US Patent Documents. In US Pat. No. 4,228,043 published October 14, 1980 [13], process and formulation for making an aqueous liquid detergent composition comprising sodium tripolyphosphate and alkalimetal orthophosphate may cause some sediment. This sediment formulation is significantly reduced by the addition of a small amount of an alkanolamine such as triethanolamine to the liquid detergent composition about 0.5 - 5 % by weight of composition.

For the invention of a stable, low viscosity, bleaching, built liquid detergent composition which published in the US Pat. Nos. 4,446,043 May 1, 1984 [14] contains 22 to 32 % by weight of sodium tripolyphosphate; 6 to 15 % by weight of an active detergent mixture of anionic sulphonate or sulphate, soap and nonionic detergent in a weight ratio of (4.5 - 8.5) : (0 - 3) : (1.5 - 4); 2- 10 % by weight of an alkali metal sulphite and 0.2 to 2.0% by weight of a non - detergent short - chain alkyl-substituted benzene sulphonate having 1-4 carbon atoms in the alkyl chain. Preferred alkalimetal sulphite is sodium sulphite and preferred short chain alkyl - substituted benzene sulphonate is sodium toluene -, xylene -, or cumene -sulphonate which can be used for suitable hydrotrope of liquid detergent. The liquid detergent composition in this patent is a structured liquid having a viscosity measured at 20° C and at 21 second shear rate of desirable not more than 7000 cp.

In US Pat. Nos. 4,452,712, published, Jun. 5, 1984, [15] stable liquid detergent composition comprising high levels of sodium tripolyphosphate and having a viscosity of 3500 - 10,000 cp. are disclosed. The liquid detergent compositions of this invention is same as the composition of US Pat. No. 4,446,043 may 1, 1984. Because of the well - balanced active detergent mixture in this invention, liquid detergent compositions are capable of keeping sodium tripolyphosphate and any particulate matter in a stable homogenous suspension whilst maintaining their liquid properties within the desired viscosity range. Not

only specified ratio in the aqueous compositions in order to achieve a stable product, but also important to mix the ingredients properly agitated in the proper sequence in order to produce a product of uniform quality from batch to batch. The preferably sequenced order of mixing is claimed in this invention. The liquid detergent composition was stored in transparent plastic bottle under ambient condition and remained stable after 2 months. When subjected to a freeze - thaw stability test the composition remained stable after four 24-hour cycles of from -4° C. to ambient temperature with no separation being observed.

The invention of US Pat. Nos. 4,652,394 published Mar 24, 1987 [9] relates to stable, built, enzyme-containing liquid detergent compositions suitable for laundry or pre-soak formulation. The composition contains 8 to 20% by weight of one or more surface active anionic detergent, 5 to 25% by weight of a water-soluble non-phosphate detergent builder salt, include water-soluble inorganic carbonate, bicarbonate and silicate salt, an enzyme stabilizing system and about 25 to 75% by weight of water. The composition of this invention are characteristically clear, single phase homogeneous solution which are physically stable over prolonged periods of storage and over a wide range of temperature.

In Thai Pat. Application No. 1137, published May 1, 1987 [2], there is disclosed an aqueous built enzyme-containing liquid detergent composition. The problem of enzyme instability is particularly acute in this composition. Primarily this is because detergent builders have a destabilizing effect on enzymes, even in compositions containing enzyme stabilizers which are otherwise effective in unbuilt formulations. Moreover, the incorporation of a builder into a liquid detergent composition poses an additional problem, usually, the ability to form a stable single-phase solution, the solubility of sodium tripolyphosphate, for example, being relatively limited in aqueous compositions and especially in the presence of anionic and nonionic detergents.

The most preferred anionic detergent compounds are the higher (12 to 15 carbon atoms) alkyl benzene sulfonate salt and preferably straight chain alkyl radical of 13-carbon atoms of alkyl polyethoxy sulfate which has 3 ethylene oxide groups. The proper ratio of alkylbenzene sulfonate and polyethoxy sulfate

is 2:1 to 8:1 by weight the most proper ratio is 3:1 to 5:1 by weight. At the ratio above 5:1 may caused the instability of physical property of product.

The comprised of builder salt in this invention is the mixture of sodium tripolyphosphate and sodium carbonate about 5 to 25% by weight of composition which to improve the detergency performance of anionic surfactant. The composition ratio of sodium tripolyphosphate and sodium carbonate is 2:1 to 6:1, the most preferably ratio is 2:1 to 4:1 specific phosphate builder is pentasodium triphosphate $\text{Na}_5 \text{P}_3 \text{O}_{10}$. Other builder may useful include tetrasodium pyrophosphate, tetrapotassium pyrophosphate sodium bicarbonate, and water-insoluble builder such as zeolite A.

The liquid detergent composition of the invention may further contain may of the adjacent normally used in fabric washing detergent composition e.g. fluorescent agent, anti-suspending and antiredeposition agents such as sodium carboxymethyl cellulose, germicides, perfume and colorants.

Summary of the invention claimed :

1. Liquid detergent composition

- (a) alkali metal alkylbenzene sulfonate, 12 to 15 carbon atom of alkyl radical from about 5 to 15 %
- (b) from about 0.5 to 5% of alkali metal alkylpolyethoxy sulfate which 10 to 18 carbon atom of alkyl group and 3 to 11 of ethylene oxide groups and proper ratio of (a) : (b) is 2:1 to 8:1
- (c) from about 5 to 20% by weight of sodium tripolyphosphate
- (d) from about 1 to 10% by weight of sodium carbonate and ratio of (c) : (d) is 2:1 to 6:1 .
- (e) an effective amount of an enzyme or enzyme mixture.

- (f) an enzyme stabilizing system containing based on the weight of detergent composition
 - (i) from about 3 to 7% of glycerin.
 - (ii) from about 1 to 5% of alkali borate
 - (iii) from about 0.5 to 4% of carboxylic acid compound
 - (g) purity water and / or other ingredients.
2. A method for preparing a homogeneous aqueous liquid detergent having a viscosity of 1,000 to 10,000 cp. and pH of 7 to 11.5.