scope of the present invention. This process produces high volumes of ammonium halide requiring the reaction tube to be opened and cleaned after each production batch is produced. This is a labor intensive process leading to significant down time.

SUMMARY ~~OF THE INVENTION~~

[0005a] In one aspect of the present disclosure, there is provided a process for preparing trisilylamine comprising:

(a) adding a solvent to a reactor vessel;

(b) adding monohalosilane into the solvent to form a solution;

(c) adding anhydrous ammonia into the solution to form a reaction mixture;

(d) separating the silylamines from the reaction mixture; and

(e) purifying the silylamines.

[0005b] In another aspect of the present disclosure, there is provided a process for preparing trisilylamine comprising:

(a) adding a solvent to a reactor vessel;

(b) adding monohalosilane into the solvent to form a solution;

(c) adding anhydrous ammonia into the solution to form a reaction mixture;

(d) separating the silylamines from the reaction mixture; and

(e) purifying the silylamines,

wherein the solvent is anisole, the monohalosilane is monochlorosilane and the silylamine trisilylamine.

[0006] The present ~~invention~~ disclosure is directed to a condensed phase batch process for synthesis of TSA comprising: (a) adding a solvent to a reactor vessel; (b) cooling the solvent; (c) condensing monohalosilane into the solvent to form a solution; (d) adding anhydrous ammonia into the solution to form a reaction mixture; (e) separating the silylamines, excess monohalosilane and TSA from the reaction mixture; and (f) purifying the silylamines to obtain TSA;

[0007] Condensed phase reactions of excess monohalosilanes, such as monochlorosilane ("MCS") with ammonia, are beneficial since the formation of TSA occurs rapidly concomitantly producing ammonium halide salt which in the case of MCS is ammonium chloride ("NH_4Cl") salt. Such salts are localized in the reaction zone as a slurry with the solvent. This approach preferably utilizes a high boiling point solvent to act as a heat-transfer medium in which the ammonium chloride salt is dispersed and downstream product removal is devoid of salt formation. The general benefit of this approach is the formation of TSA in the condensed phase followed by vacuum stripping of the product from the reaction slurry and discharge of the waste salt/solvent slurry from the reactor vessel after which the reactor can be re-charged with solvent and excess, liquefied

monohalosilane for another batch synthesis. In this condensed phase process, the reactor does not have to be cleaned before the next batch run as the ammonium chloride salt byproduct of the reaction is removed as a slurry in the solvent.

[0008] This condensed phase reaction scheme provides the following benefits:

A. Low temperature, condensed-phase reactions of ammonia with monohalosilane in a solvent in which the formation of TSA is enhanced over a relatively short period of time.

B. Suitable solvents such as anisole (methoxybenzene) provide vapor pressure depression/boiling point elevation of the MCS reagent, which promotes the formation of liquefied MCS and favorable condensed-phase disilylamine ("DSA") intermediate reaction kinetics.

C. The solvent acts as a uniform heat transfer medium in which byproduct waste salt is dispersed and localized predominantly in the reaction mixture.

D. The suppression of partially substituted silylamines (such as DSA) that could react further down stream during product collection.

[0010] The complete reaction is:

[0011] $4\ NH_3 + 3\ SiH_3X \rightarrow 3\ NH_4X + (SiH_3)_3N$

[0012] It is believed that the silylamines of the present ~~invention~~ disclosure are produced in accord with the following reaction sequence:

[0013] $2\ NH_3 + SiH_3X \rightarrow NH_4X + SiH_3NH_2$

[0014] $2\ SiH_3NH_2 \rightarrow NH_3 + (SiH_3)_2NH$