

## Nature of Invention: Process design

**Applicant:** Chimique Inc

**Inventors:** 1. Sparsh Goyal

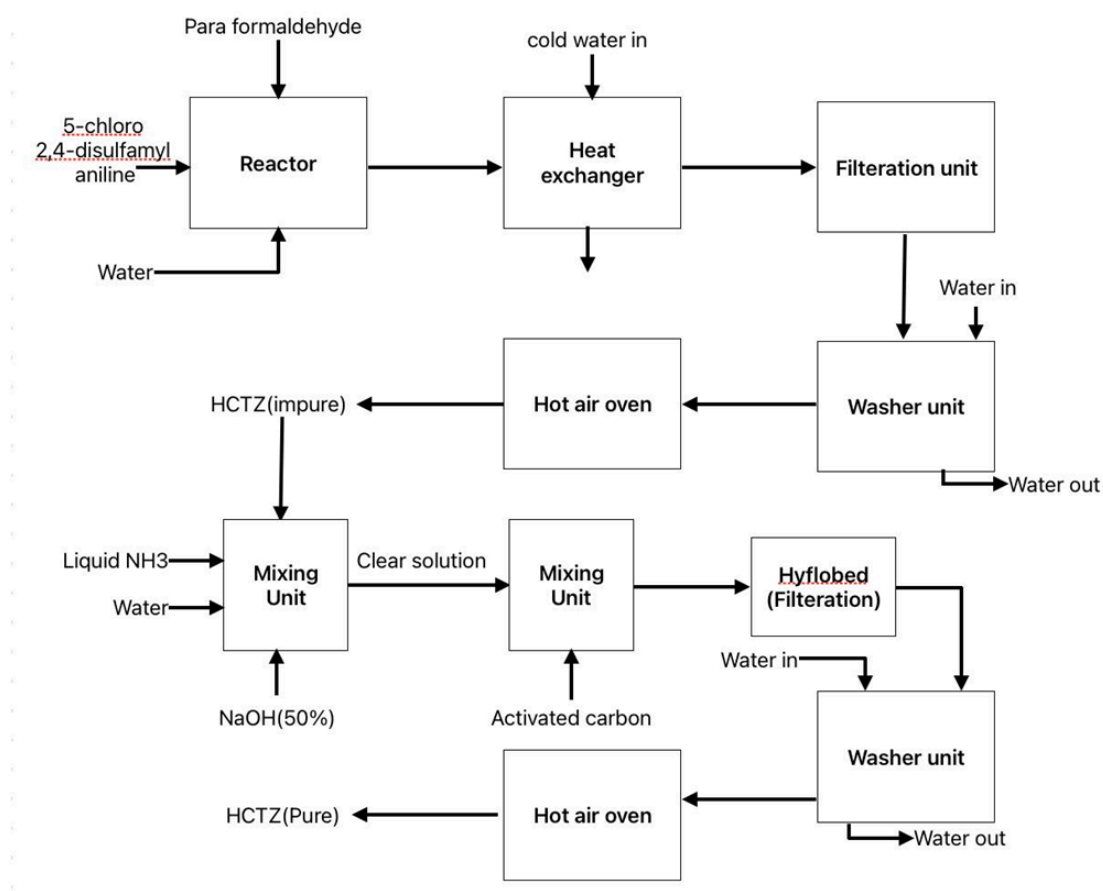
2. Avinash Kumar

**Chemical Formula:**  $C_7H_8ClN_3O_4S_2$

**Chemical Name:** 6-Chloro-3,4-dihydro-2H-1,2,4-benzothiadiazine-7-sulfonamide 1,1-dioxide (Hydrochlorothiazide)

## Process Description:

- a. Give the block diagram for the feasible process (as determined in the market analysis report). List all unit operations and process conditions.



- b. Give the material balance for a scaled-up process plant with capacity of 1000 kg/day. (If needed, simplify the calculations by stating assumptions)

Carbon needed = 25 Kg/day

Ammonia water mixture needed= 6250 L/day

Impure HCTZ produced = 1650 Kg/day

5-chloro 2,4-disulfamyl aniline = 1793.48 Kg/day

Para formaldehyde = 119.2 Kg/day

Assumptions-

1. Assuming reactors are running continuously and are in steady state production.
  2. Assuming all components of the plant are working at full capacity.
- c. List the capacity of reactors needed and evaluate the cost. Use Glass lined Carbon steel (GS lined CS) as the material of construction (MOC). Use the pressure according to reaction conditions. You will use only 70% of the total volume. If you design a 1000 L reactor, you can only fill 700 L reaction mixture.

Capital cost (only for the reactors):

Assumption- All capacities are based on flow rates needed per hour.

Equipment	Design Capacity (L)	No. of units	Cost/unit (\$ for year 2014)	Total Cost (\$ for year 2014)
Reactor 1	500	1	18500	18500
Mixing Unit	2500	2	112400	224800
Heat Exchanger	500	1	19600	19600

Reference:

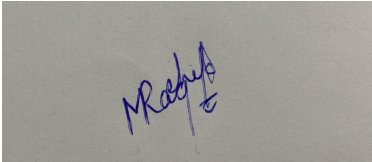
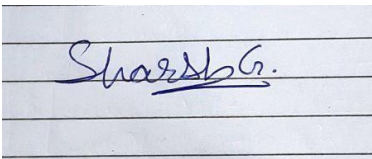
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List the contributions of each author:

- Avinash kumar and Sparsh goyal carried out the literature search and find the reaction steps, and product yield. and they also evaluated the reactor cost.
- further they found necessary separation steps to achieve desired product purity.

## CHE261A Patent Application

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