Annexure-I

List of Products & Raw materials

Sr. No.	Name of Product	Capacity (MT/Month)
Technical Products		
1	Aluminum Phosphide (79 – 82%)	150
2	Zinc Phosphide (92 – 95%)	60
Formulation Products		
1	Aluminium Phosphide (56-60% TC)	215
2	Zinc Phosphide (80% TC)	70
By Product		
1	H_3PO_4 (56-60%)	45

List of Raw Materials

Sr. No.	Name of raw materials	Total Consumption MT/Month
Technical Products		
Aluminum Phosphide - 150 MT/month		
1	Yellow Phosphorous	72
2	Aluminum Powder	79.5
3	Graphite powder	2.25
4	Saw dust	4.5
5	Wax	6.75
Zinc Phosphide – 60 MT/month		
1	Yellow Phosphorous	16.0
2	Zinc Powder	47
Formulation Products		
Aluminum Phosphide - 215 MT/month		
1	Aluminum Phosphide	150
2	Paraffin Wax	4.3
3	Urea	34.83
4	Black Carbon	0.645
5	Ammonium Carbamate	17.4
6	Graphite	2.15
7	Aluminium Stearate	5.6
Zinc Phosphide – 70 MT/month		
1	Zinc Phosphide	60.0
2	Iron Oxide	10.0

Annexure-II

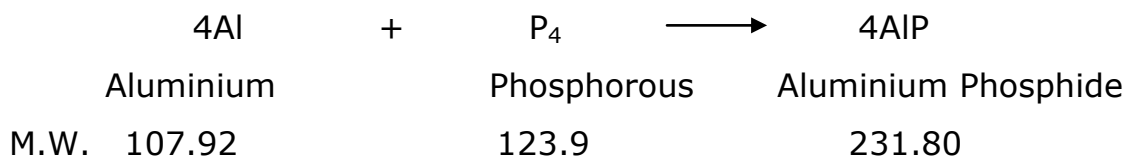
Manufacturing Process

1. Aluminium Phosphide

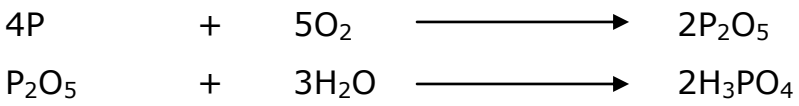
Manufacturing process:

Aluminium powder along with saw dust and graphite powder fed into the reaction pot. The lid is placed on the pot and is take for mixing. Yellow Phosphorous is then added gradually into reaction pot, keeping the inert gas blanketing and stirring. After the proper mixing is done, reaction pot is taken to the reaction chamber, where the reaction is carried out by removing inert blanketing. The Phosphorus is converting into P_2O_5 producing Heat up to 600^oC to start Aluminium Phosphide reaction. The P_2O_5 generated during the reaction is scrubbed with water to form Phosphoric Acid. The Phosphoric Acid thus generated is re - circulated at scrubber to get higher concentration of Phosphoric Acid (H_3PO_4). The tail gas scrubber is provided to scrub residual gas before discharging to atmosphere with high level stack. After natural cooling, reacted mass is wax coated in the rod mil and then formulated in the ribbon blender to give Aluminum Phosphide in powder form for the packing.

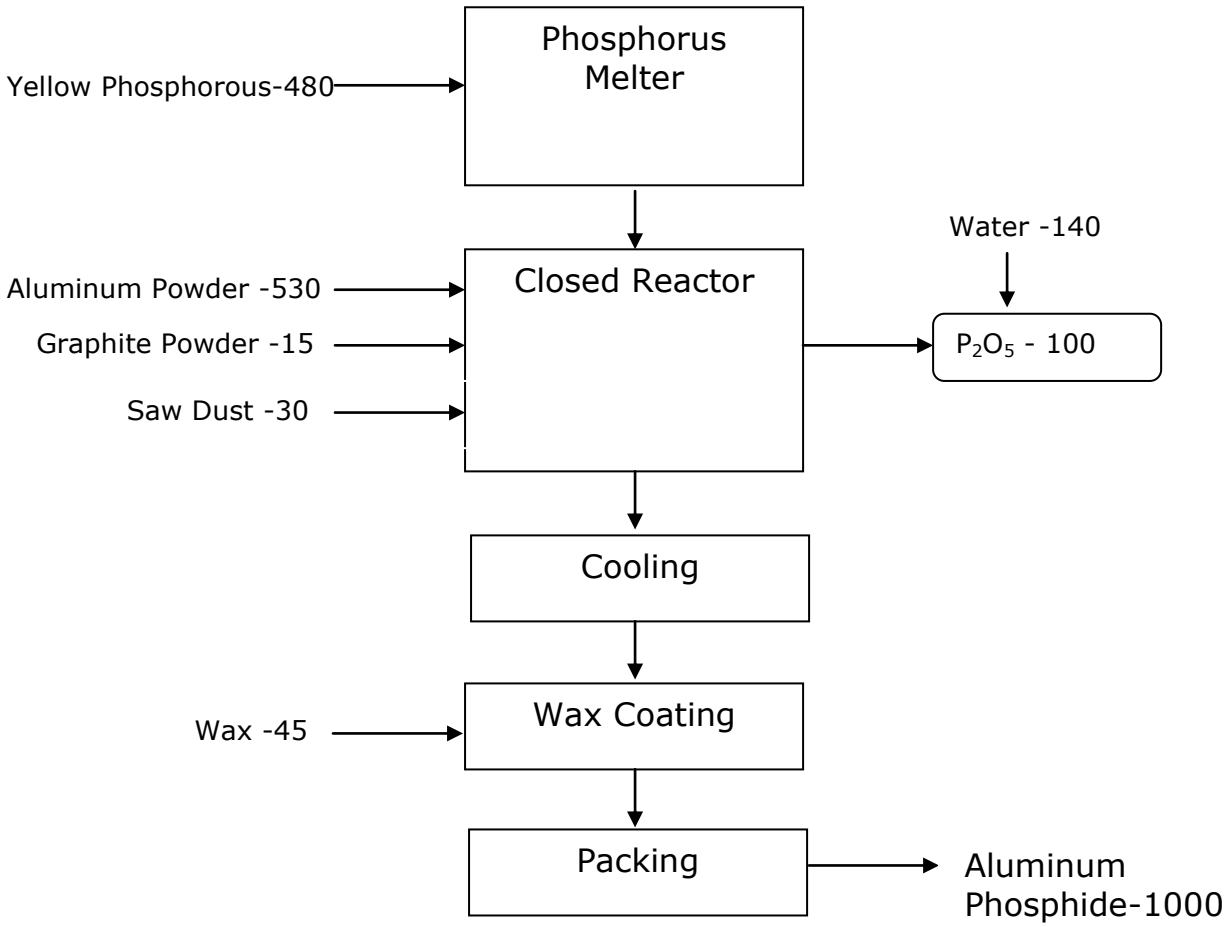
Chemical Reaction:



Reaction to form Phosphoric Acid:



Mass Balance:



1100 **1100**

Note: Aluminium Phosphide contains impurities of Aluminium Oxide and ash of saw dust & Graphite.

2. Zinc Phosphide

Manufacturing process:

Zinc Dust/Zinc Dross is taken into the reactor. Phosphorous is added gradually at control condition. The reaction between Zinc Dust & Phosphorous takes place in the reaction Vessel to form Zinc Phosphide which is an exothermic reaction. The reacted Phosphorus is converted into P_2O_5 which is scrubbed in absorption tower to form phosphoric acid as a byproduct.

Chemical Reaction:

$$6Zn + P_4 \longrightarrow 2ZnP$$

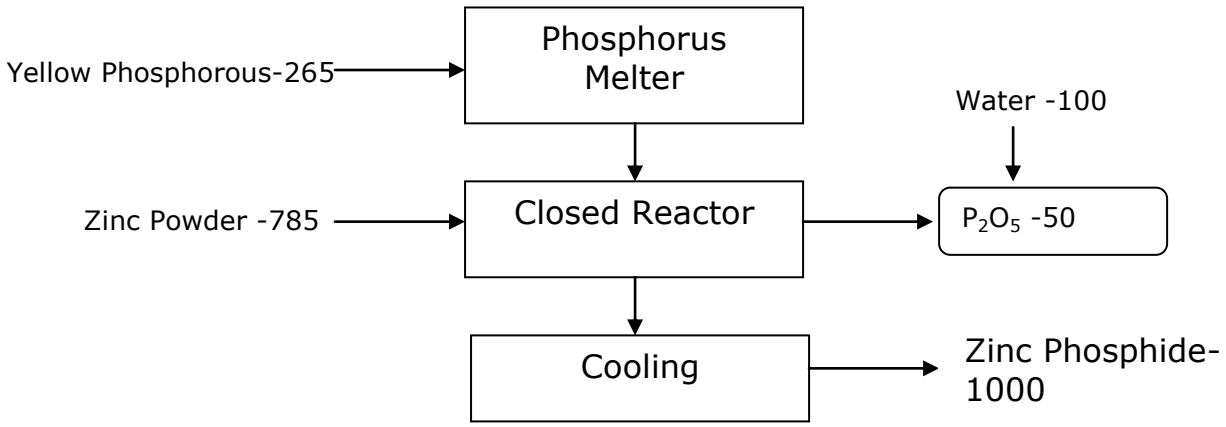
	Zinc Dust	Phosphorous	Zinc Phosphide
M.W.	392.3	123.88	516.2

Reaction to form Phosphoric Acid:

$$4P + 5O_2 \longrightarrow 2P_2O_5$$

$$P_2O_5 + 3H_2O \longrightarrow 2H_3PO_4$$

Mass Balance:



1050 **1050**

Note: Zinc Phosphide contains impurities of Zinc Oxide.

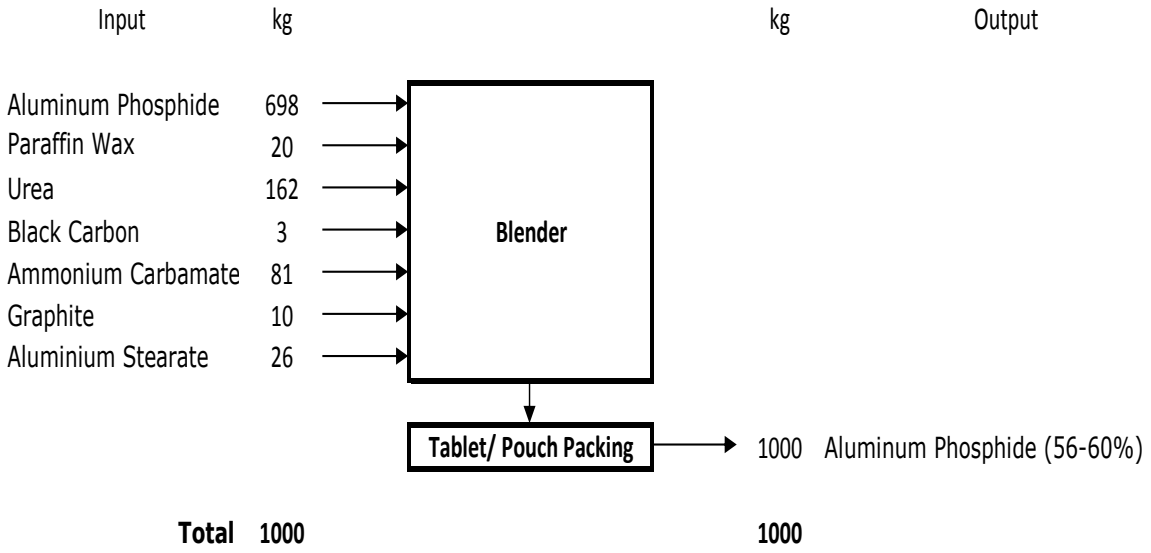
3. Aluminium Phosphide (Formulation)

Manufacturing process:

Technical Grade Aluminium Phosphide is mix with ingredients like Wax, Urea, Graphite, Ammonium Carbamate, Aluminium stearate in blender to produce Aluminum Phosphide formulation product which have around 56-60% of purity of technical products. This product is then taken for packing as per customer requirement.

Mass Balance:

Mass Balance of Aluminium Phosphide

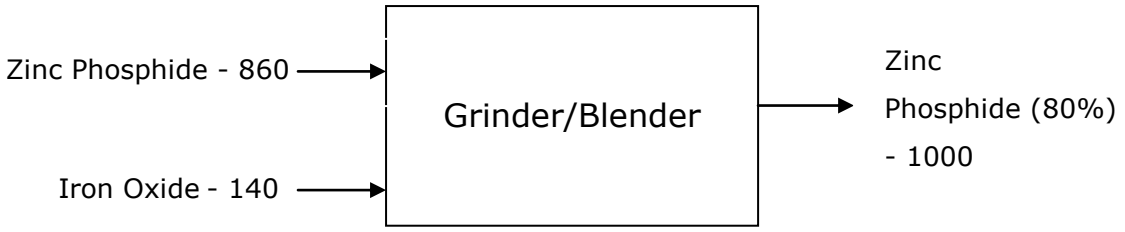


4. Zinc Phosphide (Formulation)

Manufacturing process:

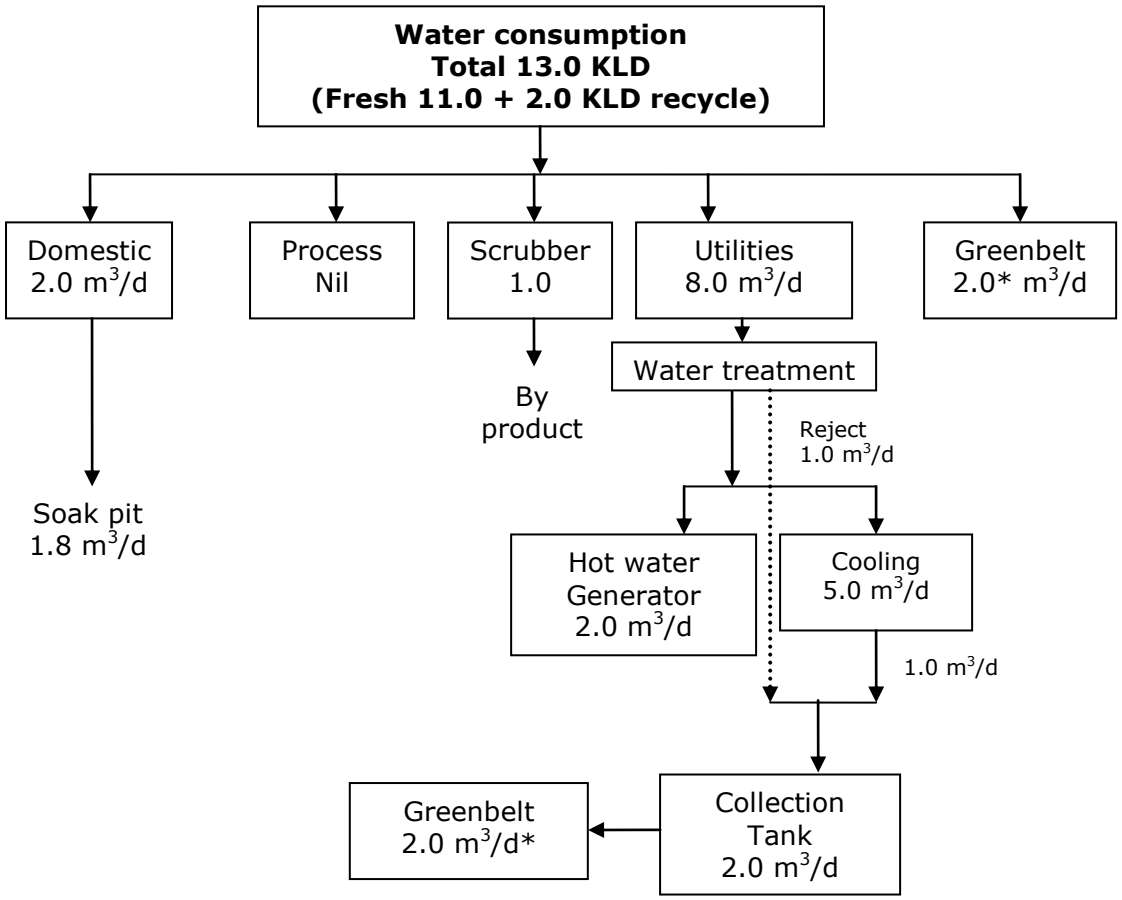
Zinc Phosphide Technical & Iron Oxide is grinded & material is formulated to the desired quality. The formulated product is packed into containers as per customer requirement.

Mass Balance:



Annexure-III

Water Balance



Source: Bore well

Facilities for treatment and disposal effluents

No wastewater generated from the process. Only reject of water treatment and bleed off of cooling tower will be generated and it is collected in collection tank. There is no need of water treatment and it is directly utilize for greenbelt development. Domestic wastewater generated from toilets (approximately 1.8 kl/day) will be disposed in septic tanks and soak pit.

Annexure-IV

Details of Air Pollution

Sr. No.	Stack attached to	Fuel Used	Consumption rate	Stack Height (m)	APCM	Pollutants
Flue Gas stacks						
01	Boiler (Hot water Generator)	Agro waste	350 kg/day	11	Cyclone	SPM < 150 mg/Nm^3 SO_2 < 100 ppm NOx < 50 ppm
02	D G Set (Stand by) (25 kVA)	HSD	10 lit/hr.	11	--	
Process gas stacks						
02	Reaction vessel of Aluminium Phosphide	--	--	11	Water Scrubber	H_3PO_4 < 10 mg/Nm^3
03	Reaction vessel of Zinc Phosphide	--	--	11		

Annexure-V

Details of Hazardous Generation and Disposal

Sr. No.	Name of waste	Category as per HWM rules, 2016	Quantity	Disposal method
1	Used oil	5.1	0.2 kl/yr.	Collection, storage, transportation & disposal by selling to registered re-refiners.
2	Discarded containers/ Drums/liners	33.1	200 nos./month 2.0 MT kg/month	Collection, storage, transportation & disposal by selling to registered recyclers.