**PROJECT PROPOSAL – ZINC POLY PHOSPHATE**

**Introduction & Background information of the Product**

**Zinc Poly Phosphate :** Zinc Poly Phosphate is an innovative product of developed in-house. It is a new category of slow release fertilizer cum micro nutrient. As per Fertilizer (Control) Order 1985 clause 20A, Zinc Poly Phosphate is a provisional fertilizer. It is considered as micronutrient as zinc poly phosphate is mainly use to provide zinc nutrient to the plant. It is low water soluble provisional fertilizer cum micro nutrient. Most of the primary nutrients gets absorbed to the plants faster and those which are not absorbed get leached into the soil resulting in inefficient nutrient use. Current market of Zinc products in India is around Rs 600 Crs, of which TCL share is about 10%. However the existing Zinc products are not slow release and are soluble in water.

After two years of extensive field trials and large scale demonstration conducted at farmer's field, attributed results superior to all the existing Zn products because of the slow release properties. The product has been found to be effective for 2-3 cycles of cropping. Lab scale production and testing has been completed at Haldia. To carry out commercial feasibility study, it is proposed to set up a pilot plant of capacity 0.3 MT/day at Haldia. On successful completion of pilot and test marketing, the project will later be scaled up to a commercial scale at a later date.

Over the years gradually, the Zinc Poly Phosphate will replace all the existing soluble Zinc products in the market. The current Indian market of Soluble Zinc products is 1,50,000 Mt/ Annum.

**Project description**

Initially the Zinc Poly Phosphate project is proposed as a pilot scale plant of 0.3 MT/day. The pilot plant is proposed to be set up in the existing plant location at Haldia where other primary Nutrients ie.- DAP, NPK and SSP are manufactured. At Haldia Tata Chemicals produces around 800000 Mt/Annum of Fertilizers from its plant at Haldia.

The existing Site layout which includes the proposed pilot plant location is attached.

**Zinc Poly Phosphate Manufacturing Process**

First of all Phosphoric acid is taken in a stirred tank reactor. Once the batch volume is taken, it is then gradually heated. This is done by putting steam in jacketed steam coils in the reactor. When the temperature attains 148°C at normal (atmospheric) pressure, then the Zinc Oxide powder is gradually added in the reactor. Steam is evolved which carries some volatile impurities from the acid. The vapour is collected in water scrubber which is recycled back into the system. After completion of ZnO addition temperature increases to 162-163 Deg C. After this water is added for crystallization. After this the resultant mixure is heated to 158 Deg C. Once temperature is reached it

is quenched with calculated quantity of water. Finally the mass is neutralized with Magnesite. At this stage only steam and Carbon Di-oxide is evolved.

The slurry is then collected and dried at 110°C in a dryer. After this the lumpy solid is pulverized in a crusher to produce fine powder of Zinc Poly Phosphate . Finally the powder is packed in small pouch packs.

**Raw materials used for production**

1. Phosphoric acid (merchant grade)
2. Zinc oxide powder
3. Magnesite Powder
4. Water

**Specific Consumption**

1. $P_2O_5$ = 0.35 T/T
2. ZnO = 0.24 T/T
3. $MgCO_3$ = 0.17 T/T

**Process Equipment** (Production Capacity - 0.3 MT/day):

1. Reactor vessel steam jacketed (volume: 300ltr capacity)
2. Phos Acid vessel (200 ltr. capacity)
3. Magnesite mixing vessel (200 ltr capacity)
4. Hopper and screw feeder for Zinc oxide
5. Temp control unit
6. scrubber unit
7. Slurry - collection Tray
8. Hot Air oven drying unit
9. Grinder

**ZINC POLY PHOSPHATE**

| Sl. no | Description | MOC |
|---|---|---|
| 1 | Agitator for Reactor | SS316 L |
| 2 | Agitator for Magnesite slurry | SS 316L |
| 3 | Dosing pump | |
| 4 | Ball valve 15 NB | SS 316 L |
| 5 | Reactor with steam coil | 904 L |
| 6 | Phos Acid storage tank | SS316 L |
| 7 | Stem line | |
| 8 | Water line | MS |

| | |
|---|---|
| 9 | Temparature controller |
| 10 | Valves |
| 11 | Service Air line |
| 12 | Phos Acid storage tank to Reactor |
| 13 | Drain pipe valve for Reactor |
| 14 | Hopper and screw conveyor |
| 15 | Civil job |
| 16 | Electrical job |
| 17 | Instrument job |

**Utility Consumption and Conditions at Battery Limit**

**Heating medium:**

| | |
|---|---|
| Saturated steam: | min. 5.0 bar, 180°C |

**Steam Consumption:**

| | |
|---|---|
| for operation: | approx. 75 kg/h |

**Electric energy:**

| | |
|---|---|
| Power installed: | 300 kW |
| Voltage: | 400 V, 50 Hz, 3-phase |
| Control voltage: | 230V AC, 50 Hz, 1-phase |

**Emissions from the process**

Emission from the reaction system contains traces of impurities from phosphoric acid (fluoride, 750 g per ton product and 8.53 kg of CO2 per ton of product) which is collected in water and recycled back into the system. At other stages only water vapor (steam) is evolved.

**Environmental impact:**

There is marginal CO2 emission from the process. Also there is no liquid effluent or any solid waste generated from the process.

**Project Schedule & cost estimates**:

At Haldia extensive Lab scale trials were taken up in house. The product trials and Lab scale manufacturing trials were very encouraging. Based on the results, it is proposed to install a pilot plant facility of 0.3 MT/day of product at Haldia. The project entails small equipments i.e. Reactor, tanks piping etc. The project is proposed to be commissioned within one month from the date of approval.

1. Mechanical: Rs 25.0 lacks
2. Civil Rs 5.0 Lacks
3. Electrical Rs 4.0 Lacks
4. Instrument Rs 3.0 lacks

**Total cost Rs 37.0 lacks**

**Operational Cost: (**Man power cost - Rs 1.2 lacks / Month +Raw material +power + Packaging.)