

Complex Fertilizer Making Plant

The fertilizer is a kind of material externally supplying in the appropriate form deficient components of essential elements for the growth of plants. Generally it contains more than one of three essential elements of nitrogen, phosphorus and potassium.

Such kinds of fertilizer are grouped according to the variety depending upon the criterion of classification. But they are divided into single fertilizer and complex fertilizer when classifying on the basis of the number of main elements contained in the fertilizer.

Of the two, such as ammonium sulfate and superphosphate of lime, the single fertilizer is the one manufactured centering on one of the three elements. The complex fertilizer is so manufactured as to contain more than two kinds of effective elements by combining these single fertilizers.

The complex fertilizer also breaks down into two depending upon manufacturing methods. One is mixed fertilizer produced by simple physical blending respective element fertilizers and the other is compound fertilizer prepared by manufacturing compounds having the fertilizer effect by chemical reaction.

The fertilizer plant introduced here is for manufacturing the type of mixed fertilizer among the complex fertilizers mentioned above. In this plant, more than two different kinds of fertilizer are blended and processed into one of the forms of powder, granule and briquette for saving labor and time in applying the fertilizer. Its effect is further improved by blending fertilizers to conform to characteristics of variable properties of soil and crops.

This mixed fertilizer plant, based on the production method of merely mechanically blending various element fertilizers, enables to produce varied products with small scale and capital requirement, being the most suitable plant as a small and medium type plant.

Products and Specifications

In this plant, ammonium sulfate, urea, potassium sulfate, potassium chloride, conc. superphosphate, superphosphate of lime and other organic fertilizers are appropriately blended to suit various uses, supplying products of diverse specifications.

In consideration of the ease of application and extension of the fertilizer effect, products can be

manufactured and processed in such varied forms as blending type, granule type and briquette type.

Typical fertilizers produced in this plant at present are the complex fertilizer for vegetables (blend type), the complex fertilizer for beans (granule type), the briquette complex fertilizer for forest (briquette type), the briquette fertilizer for field crops and the complex fertilizer for horticulture (granule type). Their characteristics and components are as follows:

○ Complex fertilizer for vegetables

Characteristics:

- Being a base fertilizer, nitrogen, phosphorus, potassium and other organic matters are properly blended.
- Improves the taste, quality and appearance of vegetables.
- Other organic matters contained in the complex fertilizer have a strong sustaining power and prevents chemical fertilizer components from being washed away. They also help invigorate activities of soil microorganisms disintegrating not readily utilized nutrients in the soil, thus helping vegetables grow. The organic matters also have a big capacity to hold moisture and minimize damages by the dry spell. They are helpful to vegetables that have to survive during the winter (onion, garlic, oil vegetables and barley) since they contribute to raising the soil temperature.

Component:

Nitrogen	9 %
Phosphate	12 %
Potassium	9 %
Organic component	40 %

○ Complex fertilizer for beans

Characteristics:

- Three elements of nitrogen, phosphorus and potassium are appropriately contained for the cultivation of beans.
- Magnesium and boron contained help strengthen the vitality of roots and increase chlorophyll, preventing fall of flowers and increasing beans.
- Can be used for other field crops with effectiveness.

Component:

Nitrogen	8 %
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Phosphate	14 %
Potassium	12 %
Magnesium	8 %
Boron	0.3 %

○ Briquette complex fertilizer for forest

Characteristics:

- Nitrogen, phosphorus and potassium are properly contained for the growth of trees.
- Being in the briquette form, the fertilizer is sustained for a long time.
- Can be used as base fertilizer or additional fertilizer in afforestation.
- Weighing about 15 grams per one, the briquette is the size of a peach seed and saves labor in use.

○ Briquette complex fertilizer for field crops

Characteristics:

- In the form of a peach seed, nitrogen, phosphorus, potassium are properly contained.
- Labor is saved when applying.
- Absorption and utilization rates are relatively high, saving 10-20% of the amount used.
- Fertilizer dissolves slowly with sustained effectiveness.
- Crops increase by 13-22 percent.

Component:

Nitrogen	13 %
Phosphate	10 %
Potassium	11 %
Boron	0.3 %

○ Complex fertilizer for horticulture

Characteristics

- As a base fertilizer for orchard and vegetables, three elements of nitrogen, phosphorus and potassium are properly contained and helps the healthy growth of fruits and vegetables.
- Containing boron and manganese, it prevents physiological diseases and enhances the harvest as well as quality.
- Containing organic matters as auxiliary components, it invigorates activities of soil microorganisms and also increases the sustaining capacity for moisture and nutrients.
- Being a reasonable complex fertilizer, it is convenient to spray and enhances its effectiveness as fertilizer.

Component:

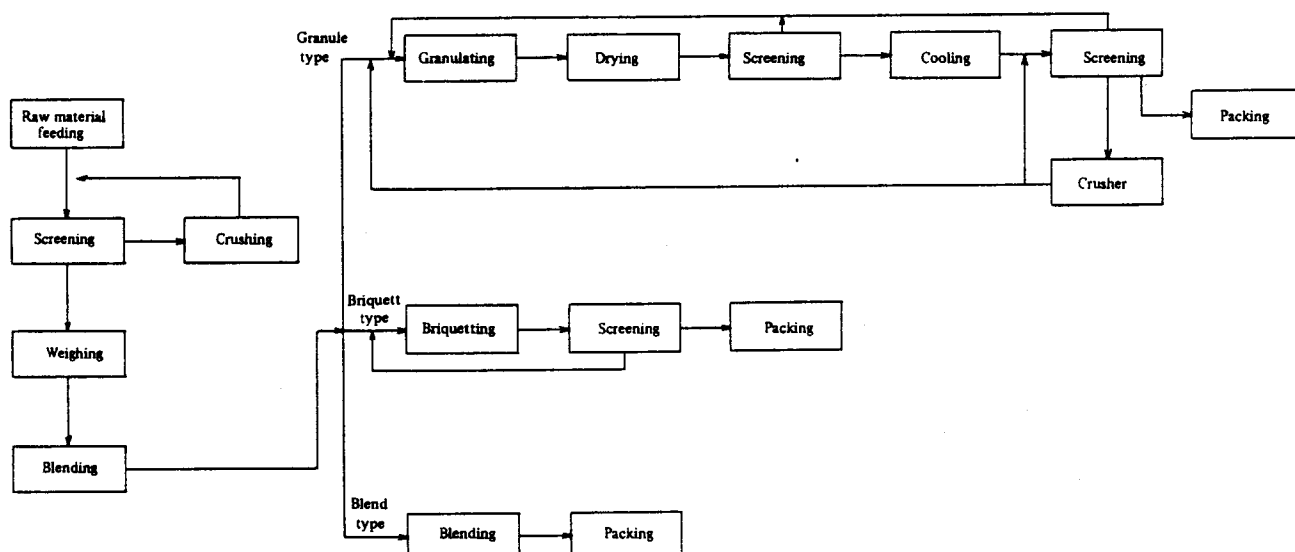
Nitrogen	11 %
Phosphate	10 %
Potassium	10 %
Magnesium	3 %
Boron	0.3 %
Organic material	3-4 %

Contents of Technology

1) Process Description

First, ammonium sulfate, urea, potassium sulfate, potassium chloride, conc. superphosphate, superphos-

Complex Fertilizer Manufacturing Process Block Diagram



parts of lime and organic fertilizer necessary for blending are weighed to suit the type of fertilizer to be produced.

Raw materials thus weighed are so blended in a mixer as to have a fixed component distribution and the maximum possible homogeneous state.

The uniformly blended mixture is conveyed to each of granulation, briquetting and blending processes depending upon desired form of the product.

In granulation process, the blended mixture is granulated in a drum-type granulator to have required granule size by using granulation liquid or other viscous liquids. It is then dried by hot air in a rotary dryer and goes through screening and cooling processes to be finished product.

In briquetting process, the blended mixture is fed into a briquetting machine and pressure is applied to form a fixed form.

In blending process, the blended mixture is blended again in a blending machine prior to packing.

2) Equipment and Machinery

Granulating section

Hammer crusher
Screens
Bucket elevators
Hopper scale
Granulator
Dryer
Blower
Cooler
Vibrating screen
Cyclones

Briquetting section

Bucket elevators
Screen
Hopper scale
Mixer
Briquetter
Vibrating screen
Hammer crusher

Blending section
Crusher
Screw conveyor
Dryer
Fan
Cyclone
Hoppers
Belt conveyors
Bucket elevators
Raw material storage tank
Hopper scale
Hammer crusher
Screens
Mixer
Packing machine
Heat sealer
Chain conveyor

Example of Plant Capacity and Construction Cost

- 1) Plant capacity : 225,000 m/t
* Basis : 24 hours/day, 300 days/year
- 2) Estimated Equipment Cost

o Manufacturing machinery	: US\$687,000
o Utility facility	: US\$ 40,000
o Installation cost	: US\$200,000
Total	: US\$927,000
- 3) Required Space

o Site area	: 1,000 m ²
o Building area	: 8,200 m ²
o Other	: 1,800 m ²
Total	: 11,000 m²
- 4) Personnel Requirement

o Manager	: 1 persons
o Engineer	: 4 persons
o Operator	: 60 persons
Total	: 65 persons

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