

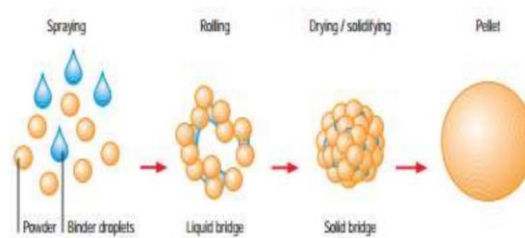
Fabrication of Granules Making Machine for Agriculture Purpose

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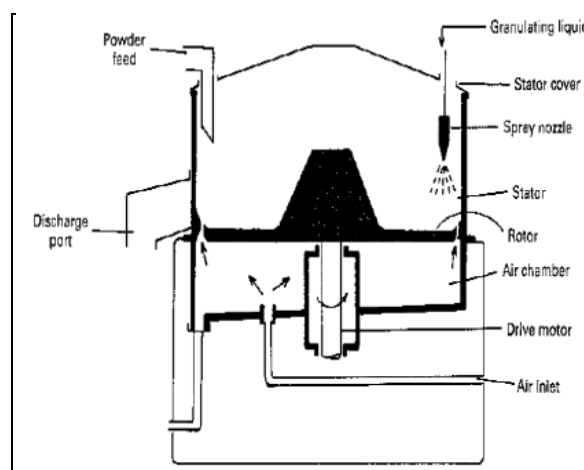
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Abstract— The main objective of this project is to convert the powder fertilizers like(Urea, Calcium Cyanamide, Ammonium Sulphate, etc.) into granules. Granulation is defined as the size enlargement process in which fine and smaller particle are aggregated to form strong and stable particles called granules. Granulation process transforms fine powders into free-flowing, dust-free granules that are easy to compress. Granulation process can be divided into two types: Wet granulation that utilize a liquid in the process and Dry granulation that requires no liquid. In this project we are using Wet granulation technique.



Schematic diagram:



Index Terms—Motor, Drum, Pellete, Stepped Pully, fly Wheel, Drum

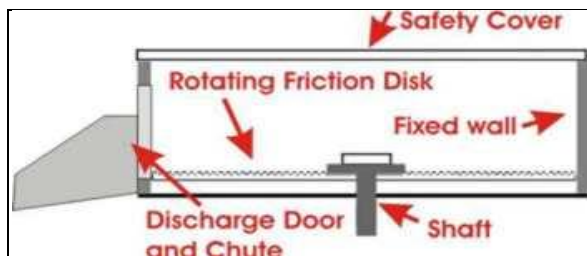
I. INTRODUCTION

Granulation is a process of forming grains or granules from a powdery substance producing a granular material. It is applied in several technological processes in the chemical, agriculture and pharmaceutical industries. The conversion of powder into granules avoids powder segregation, enhances the flow properties of powders, produces uniform mixtures, produces dust free formulations and improves compaction. Granulation involves agglomeration of fine particles into large granules, typically of size range between 2 and 5mm depending upon their requirement. Wet granulation method is a process in which fine powder particles are agglomerated or brought together into larger, strong and relatively permanent structure called granules using a suitable non-toxic granulating fluid such as water, isopropanol or ethanol.

Figures

II. METHODOLOGY

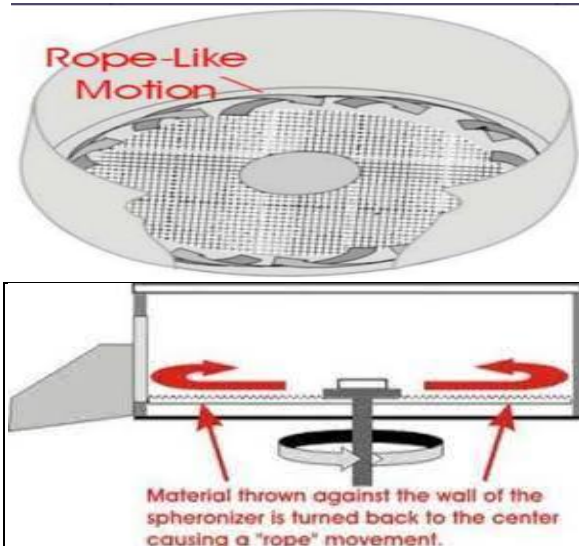
The model was designed using consists of a static cylinder, bearings, frame and a rotating friction plate or disk at the base. The friction plate, a rotating disk which has a grooved surface, is the most important part of the equipment that initiates the granulation process. A standard friction plate has a cross-hatch pattern, where the grooves intersect at a 90o angle.



The groove width is selected based on the desired granule diameter. Usually groove diameter 1.5-2 times the target pellet diameter are used. The diameter of the friction plate is approximately 45 cm for laboratory-scale equipment .

III. WORKING PRINCIPLE

The basic granulation machine consists of a rotating friction disk designed to impart friction to the extrudate by spinning at the bottom of a fixed cylindrical drum. The spinning friction disc has variety of groove patterns on the processing surface to chose from. Powder fall onto the spinning disc and are immediately thrown to the drum wall. After a certain amount of time which then, as time progresses, collide with the bowl wall as well as each other and the disc and are then thrown back to the inside of the disc. The ongoing action of particles colliding with the drum wall and the disc and each other creates a "rope-like" movement of product along the bowl wall. The cylindrical segments are gradually rounded into spheres by the collisions.



When the particles have obtained the desired spherical shape, the discharge valve of the chamber is opened and the granules are discharged by the centrifugal

force. This process usually takes somewhere between 1 to 6 minutes.



Fig : Granular machine



Fig : Friction plate

IV. TESTING RESULT

Urea:

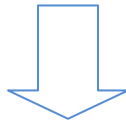
S.No.	Load (kg)	Time to form granules (min)
1	2	3.34
2	4	5.25
3	6	7.54

Ammonium Sulphate:

S.No.	Load (kg)	Time to form granules (min)
1	2	2.56
2	4	4.20
3	6	6.34

V. RESULTS

S.No.	Fertilizer name	Granular size
1	Urea	2 – 4.5 mm
2	Calcium Cyanamide	2 – 5 mm
3	Ammonium Sulphate	1 – 4 mm



VI. CONCLUSION

The Granulation process can be used to prepare granules that can be used as granulations for solid dosage forms compression and as specially formulated or coated controlled release matrices. By using the granulation technique we prevent the leaves from the dust of fertilizer and also maintain proper photosynthesis. Granulated fertilizers are easy to apply, which is convenient for farmers who may have trouble applying traditional powdered fertilizers. Granulated fertilizers provide nutrients throughout their growing period, and their nutrients don't run off into waterways or cause environmental problems.

REFERENCE

- [1] The design and manufacture of medicines (edited by Michael. EAulton), 3rd edition. Aulton's (pharmaceutics) page: 419-422.
- [2] Inventirapid: pharma tech journal; review on extrusion and spherization (publication date 20-10-2012).
- [3] A literature review., Chris Vervaet, Lieven Baert and Jean Paul Remon. International journal of pharmaceutics volume 116 (28th march 1995).
- [4] www.umangpharmaceuticals.com.