EXWOLD
GRANULATION TECHNIQUES

Introduction

In this topic we look at the potential benefits of granulation technology along with the different forms of granulation available to the speciality chemical and agrochemical sectors, particularly featuring the processes that can be accessed at Exwold Technology Ltd.

It covers the methods of granulation generally undertaken, the benefits and problems associated with the various methods, and the potential issues that may arise and how to avoid them.

Why Granulate a Material?

Granulation of materials can bring many benefits including:

- De-dusting of fine powders
- Improvements to the safe handling of materials
- Prevention of particle separation
- Particle size control
- Material flow properties
- Bulk density control
- Storage stability improvements

For many formulations granulation can offer substantial performance improvements by ensuring that the finished product contains precisely the correct balance of active ingredient and additives to every batch. This aspect can be especially important for agrochemical formulations and can offer solutions to problems that may be difficult to otherwise overcome.

Techniques Available

The overall topic of 'granulation' can be wide and varied and as such be confusing.

For clarity the areas of granulation covered here will be:

- Coating
- Impregnation
- Extrusion
- Compaction

Coating

The simplest method of producing a granule is to apply a coating of a liquid to a solid material by absorption. Often the solid material is a carrier for a liquid active, although this can be reversed where the solid material is the active ingredient and the liquid is a coating to control dust. In this process there is no change in particle size as such, however, with the correct formulation, it is possible to control dust issues.

This type of granulation is generally done in a ribbon or drum blender. The pictures below show typical equipment.

Figure 1 : Ribbon Blender

Figure 2 : Drum Blender

Exwold Technology Limited, PO Box 270, Brenda Road, Hartlepool TS25 2BW UK
T: +44 (0) 1429 230340 F: +44 (0) 1429 232996 E: enquiries@exwold.com www.exwold.com

These mixers may be fitted with ancillary equipment such as screens or sifters to the inlet to remove larger lumps, internal spray bars for even liquid distribution or sieves on the outlet to remove undesired fines or oversize.

Indirect heating can be used to dry the coated granule if required. This will require suitable heating and air management equipment including, in some cases, odour control.

Impregnation

This process is similar to the coating process and the same type of equipment may be used. The difference is that the liquid is absorbed into the granule structure. With a suitable formulation this can be used to deliver a liquid active material that can be released on application.

The same kind of ancillary equipment can be included in the design.

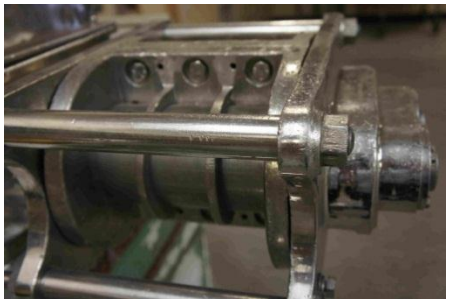
Extrusion

In this process raw materials are prepared for the process upstream according to the required properties of the finished product. This can include milling some or all of the solid component materials, blending, sieving or sifting.

The choice of milling technique will be determined by the required finished properties of the formulation and will usually be a choice between a jet mill and an air classifier mill (ACM). A jet mill will generally provide a finer milled material than an air classifier mill.

Once the material has been prepared it can be brought to the extrusion stage which will involve a number of discrete steps, such as feeding the material to the process, blending with any liquid components, the actual extrusion step itself, drying and sieving.

At Exwold we can offer low pressure radial extrusion that will produce granules that demonstrate excellent physical properties such as suspension, dispersion and low wet sieve residue levels. These characteristics can be controlled through good formulation and careful processing techniques.



A typical radial extruder is shown in Figure 3.