

### **369d Constraints on the Kernel of the Multiple Fragmentation (Breakage) Equation**

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The fragmentation or breakage equation has traditionally been written in two forms: as a binary breakage equation, in which all events are necessarily binary, and in a multiple breakup form where the rate of breakup of a particle of mass  $x$  is given by  $a(x)$  and the daughter-size distribution is a function  $b(y|x)$  with the average number of daughters given by  $N$ , which can be different than two, non-integer, and even less than 1. Here we show how these various kernels can be explained physically -- either as combinations of various integer events, or as events involving mass rearrangement (which is more difficult to imagine physically). The question of what conditions are placed upon  $b(y|x)$  so that it can describe a physical situation is posed. Some conditions are given, but it is not clear what the most general conditions are. Some specific examples of breakage functions are given.