

ACCELERATION OF PARTICLE BREAKAGE RATES IN WET BATCH BALL MILLING

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Abstract

Batch wet grinding of 20 x 30 mesh quartz for slurry concentrations up to 56 vol.% solid showed an increase in the specific breakage rate of the top size feed as fines built up in the mill. The degree of this acceleration effect was represented by a parameter termed the acceleration factor, which depended both on the slurry concentration and the fineness of grinding. An empirical equation was developed to correlate the acceleration factor with slurry apparent viscosity, a characteristic size distribution and slurry concentration. The mechanism of rate acceleration was hypothesized to result from the ability of the degree of flow turbulence prevailing in the charge. The overall effect gave rise to the classification of particles so that some remained in suspension and some resided on the grinding surfaces. © 2002 Elsevier Science B.V. All right reserved.

Keywords: Wet grinding; Ball mills; Slurry rheology; Breakage rate acceleration