Feasibility of an Air Classifier to Recover Metallic Particles from Analytical Samples

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Abstract

Feasibility of a vertical duct air classifier to preconcentrate gold particles from analytical samples is investigated. Analyzing nuggety gold samples commonly produces erratic fire assay results. The designed air classifier must produce a concentrate sample with a mass of 15-30 grams and total recovery must exceed 95%. Effects of air velocity, feed rate and particle density on the recovery of tungsten from tungsten-silica mixtures are studied. Air is used as a fluidizing medium and tungsten-silica mixture (0.25% w/w) is used as synthetic ore to mimic the composition of gold ore. The air classifier operated on a dry basis yielding optimal tungsten recovery of 97.7 % at an air velocity of 0.72 m/s and feed rate of 160 g/min. In terms of preconcentrating sample to the desired mass range, optimal parameters were: air velocity 0.72 m/s and feed rate 93 g/min, attaining tungsten recovery of 96.68%. Effects of density on classification are investigated by using iron instead of tungsten and the recovery is seen to drop from 96.13% to 20.82%. Preliminary investigations suggest that preconcentration of gold samples is feasible using the laboratory designed air classifier.