The formation of slime particles in the processes of crushing and grinding of minerals is a factor that limits froth flotation. Minera de Orgiva S.L. (Spain) produces slime sludge containing 41.05% Ca from the benefice of a fluorite ore. Slimes have a very small particle diameter with very high specific surface area making this material difficult to process by froth flotation technique even when the law of the material is high. Furthermore, removing this fraction of the mineral from the flotation process generates waste that causes the appearance of slagheap that affect negatively the environment. In order to make this byproduct salable in the metallurgical fluorspar market, this research studies the influence of physical variables and pH in the flotation process of fluorite slimes. Four variables were studied: aeration flow rate, time of flotation, agitator speed and pH. In order to evaluate the influence of each variable the results were adjusted to a polynomial mathematical model based in the relation between the variables and the measured factors. Optimizing the process 76.21% of fluorite law is achieved in a single rougher steep with a metallurgical recovery of 70.57% using values of 0.8 m3/h air flow rate, 7 minutes of time flotation, 1100 rpm and pH 9.25.