Potential of the Dense Media Cyclone for Gold Ore Preconcentration

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ABSTRACT

To date the dense media cyclone has had wide applications in beneficiation of coal, iron ore, diamonds and base metals. While it is well known that the dense media cyclone is extremely efficient for separating mineral particles based on their particle densities, its application for use in preconcentrating precious metals, such as gold, has been limited. This paper reports and discusses data from experimental evaluations of the dense media cyclone for preconcentrating gold ores. Two ore types were tested in the particle size range from 0.3 mm to 4.75 mm, which was considered as a pumpable size range. A cyclone with a diameter of 100 mm was used to separate the gold ores at separation densities ranging from 2550 kg/m^3 to 2950 kg/m^3. The separation densities, achieved by varying spigot diameter and feed water rates, were verified using tracers before feeding the samples through the cyclone. The separation stability was checked by calculating the separation differential from the feed and overflow streams. Evaluation of the data confirm the potential for the dense media cyclone to be used for gold ore preconcentration as it demonstrates a high potential for upgrading gold into the underflow stream with very low gold grades found in the overflow stream. For example, one of the ores tested at a separation density of 2950 kg/m^3 achieved a mass yield of 7.27% reporting to the underflow with total gold reporting to the underflow stream at 91.05%. The same ore separated at 2550 kg/m^3 reported 79.13% mass to the underflow with 99.70% of gold from the feed reporting to the underflow. An optimum density of separation can therefore be obtained within the range where there is a balance between overall mass rejected and gold recovery.

Keywords

Dense media cyclone, dense media separation, preconcentration of gold ores, mineral beneficiation