OPC INDUSTRIAL & MINING

Solids by mass vs solids by volume

Paste backfill reference card · what the pipe wall actually sees

The plant says 80% solids. What is that by volume?

Take 100 kg of paste at 80% solids: 80 kg of rock, 20 kg of water. The water takes up 20 litres. The rock takes up 80 divided by its specific gravity:

Gold tailing, SG 2.2: 80 ÷ 2.2 = 36 L of rock
Solids by volume: 36 ÷ (36 + 20) = 65%

Nickel tailing, SG 3.0: 80 ÷ 3.0 = 27 L of rock
Solids by volume: 27 ÷ (27 + 20) = 57%

Same number on the plant screen, eight points less by volume, because dense rock takes up less room. The wall wears on what is physically rubbing it. That is the volume share, not the mass figure.

The line our returned parts come off

Gold tailing, SG 2.2. Better than 80% solids by mass, slump 10½ to 11 in. That puts it at about 65% solids by volume, and about 67% on the days it runs 82%. The 6-in hardfaced elbow at the borehole collar, the last fitting before the paste goes down the hole, came out at over 110,000 tonnes on that line.

A heavier tailing in the low to mid 80s by mass sits at 60 to 65% by volume. On the volume basis the comparison is like for like, or in the heavier tailing's favour.

Solids by volume, %

Your plant's solids figure down the side. Your tailings SG along the top. The cell is solids by volume: the share of the paste that is rock.

% solids	SG 2.2	SG 2.5	SG 2.8	SG 3.1
76%	59	56	53	51
78%	62	59	56	53
80%	65	62	59	56
82%	67	65	62	60
84%	70	68	65	63
86%	74	71	69	66

Outlined cell: the line our parts come off. 80% at SG 2.2 is 65% solids by volume.

Read across a row: the same plant figure drops 8 to 10 points by volume from a light gold tailing to a heavy base-metal tailing. Read down a column: each 2% by mass is worth about 3% by volume at this end of the range.

Typical dry SG: gold (quartz-carbonate) 2.2 to 2.7; nickel-copper 2.8 to 3.3, higher with more sulphide. Use your own lab number where you have one.

Formula, if you want it: $Cv = (Cw \div SG) \div [\, Cw \div SG + (1 - Cw) \,]$, Cw as a fraction, water at 1.0

Three numbers put your line on the same page: % solids, tailings SG, slump. Send them and the record comes back on your basis.

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