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Methods for sampling and sample preparation of flotation gold concentrates

浮选金精矿取样、制样方法

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Methods for sampling and sample preparation of flotation gold concentrates

1 Scope

This standard specifies the methods for sampling and sample preparation of flotation gold concentrate, methods for determination of moisture, test methods for the quality fluctuation of gold concentrate assessment, test methods for the precision of calibration sampling.

This standard is applicable to the sampling and preparation of samples for the chemical composition and moisture of bulk and bagged flotation gold concentrates as well as the determination of moisture.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this standard.

GB/T 7739 Methods for chemical analysis of gold concentrates

YS/T 3004 Gold concentrate

3 Terms and definitions

The following terms and definitions apply to this document.

3.1

Lot

A lot of gold concentrates to be sampled for testing of quality characteristics. The mass of the gold concentrate that constitutes a lot is the lot mass.

3.2

Sub-lot

If a lot is divided into several parts, each part is a sub-lot. The mass of the

5.5 Sampling method

5.5.1 Systematic sampling

5.5.1.1 In the course of movement of bulk gold concentrates during handling or weighing, take increment based on certain mass interval or time interval.

5.5.1.2 Use the formula (1) to calculate the mass interval of sampling.

$$\Delta m = \frac{m}{N_{min}} \qquad \cdots\cdots(1)$$

Where:

Δm - The quantitative sampling interval value between two increments, in tons (t), which retains an integer;

m - The mass of the lot, in tons (t);

N_{min} - The minimum number of increment as specified in Table 1.

5.5.1.3 Use the formula (2) to calculate the time interval of sampling.

$$\Delta T = \frac{60m}{G_{max} N_{min}} \qquad \cdots\cdots(2)$$

Where:

ΔT - Time interval of sampling, in minutes (min), which retains an integer;

m - Lot mass, in tons (t);

N_{min} - The number of increments as specified in the standard;

G_{max} - The maximum flow rate of gold concentrate, in tons/hour (t/h).

5.5.1.4 At any point within the first sampling interval, take the first increment. The subsequent increments shall be taken at fixed interval, until finishing the movement process of the entire lot of gold concentrates.

5.5.1.5 It shall select the sampling device of appropriate size to collect the full-width, full-thickness gold concentrate stream.

5.5.2 Truck sampling

5.5.2.1 From the motor vehicles, trains, bins which are loaded with gold concentrates, take the increment.

5.5.2.2 The material surface of the gold concentrate shall be flat. Based on the

5.5.4.3 The number of bags of the lot of gold concentrate is more than the number of increments as specified in Table 1. In the course of handling, take increment at the interval of a certain number of bags. The sampling interval is calculated according to the formula (4). From the selected packaging bag, take increment.

$$\Delta N \leqslant \frac{N_1}{N_{min}} \qquad \cdots\cdots(4)$$

Where:

ΔN - Interval of sampling bag, in bags, which takes an integer;

N_1 - Number of bags in a lot;

N_{min} - Number of increments specified in Table 1.

5.5.4.4 If the number of bags of the lot of gold concentrate is less than the number of increments as specified in Table 1, from each packaging bag, use the brazing bar for sampling to take the increment. The minimum number of increments to be taken is calculated according to formula (5).

$$n_b \leqslant \frac{N_{min}}{N_1} \qquad \cdots\cdots(5)$$

Where:

n_b - The minimum number of increments to be taken per bag, where the decimal fraction is rounded off to an integer;

N_{min} - The number of increments as specified in Table 1;

N_1 - The number of packaging bags in a lot.

5.5.4.5 For the bagged gold concentrates, it may also use the method of 5.5.3 to take increment.

6 Sample preparation

6.1 Sample preparation equipment and tools

6.1.1 Grinder or rod mill.

6.1.2 Constant-temperature drying oven.

6.1.3 Non-absorbent division plates, stainless-steel cross-split plates, baffles, rubber.

6.3 Sample preparation procedure

6.3.1 Weigh and check the mass of the lot sample and subsample.

6.3.2 Establish the sample preparation plane, which shall include the following:

a) Clarify the use of the specimen;

b) Select a mixing method and a division method of the sample;

c) Equipment and tools for sample preparation;

d) Whether to retain the subsample;

e) Date of completion.

6.3.3 Check the cleaning facilities and equipment.

6.3.4 According to the plan, prepare specimen and make record.

6.3.5 Preparation of moisture specimen

Mix the sample in a sealed container and plastic bag. Use the increment division method to prepare moisture specimen. Use the lot sample to prepare two parallel moisture specimens. Use each subsample to prepare one moisture specimen. The mass of moisture specimen is not less than 1000 g. Contain it in a sealed container or plastic bag. It shall carry out moisture determination as soon as possible according to Appendix A.

6.3.6 Preparation of chemical composition specimen

Select the mixing method to mix the lot sample or the lot sample which is composed of subsamples. Select the division method to reduce the sample to not less than 1000 g. Place it in a drying tray. Put it into a constant-temperature drying oven at 105 °C ± 5 °C. Keep this temperature for not less than 3 h. Place the dried and naturally cooled sample or the specimen after moisture determination on the sample mixing rubber. Use the division plate to grind the bonded concentrate to spread it. Mix it uniformly. Take not less than 500 g of sample. Use the grinder to grind it to such grain size that it can all pass through the 74 μm standard sieve. After mixing it uniformly again, divide it into 3 sets of samples. The mass of each set is not less than 150 g. Divide it into the specimen bags. These are the acceptance specimen, supplier specimen, arbitration specimen for the chemical composition.

6.4 Mixing method

6.4.1 Rolling method

Place the sample on a clean sample-mixing rubber. Lift the opposite corners of

Appendix A

(Normative)

Method for determination of moisture of gold concentrates

A.1 Scope

This Appendix specifies the method for determining the moisture of gold concentrate.

This Appendix applies to the determination of moisture of gold concentrates.

A.2 Requirements

A.2.1 It shall strictly control the drying temperature of the gold concentrate.

A.2.2 After the specimen is dried, it shall not weigh it after placing it in the air to cool it down.

A.2.3 The enamel drying tray shall have a smooth surface, be heat-resistant and corrosion-resistant, be able to accommodate a specimen layer of 30 mm thickness.

A.2.4 The drying tray which contains the moisture specimen shall not be stacked. The markings on the tray shall be clear.

A.3 Equipment

A.3.1 Balance, which has an accuracy of 0.01 g.

A.3.2 Constant-temperature drying oven.

A.4 Specimen

A.4.1 When using the lot sample to prepare moisture specimen, it shall prepare two moisture specimens. The mass of each specimen shall be not less than 1000 g.

A.4.2 If the moisture of the lot changes significantly or the lot mass increases due to rainfall, it shall use the subsample to prepare the moisture specimen. Record the mass of each sub-lot.

A.4.3 When the drying tray which contains the moisture specimen is placed in the oven in layers high-and-low, the bottom of the sample tray shall be clean.

A.5 Determination steps

Appendix B

(Normative)

Gold concentrate - Test method for assessment of quality fluctuation

B.1 Scope

This Appendix specifies the test methods, assessment methods and calculation of results for the assessment of quality fluctuations of gold concentrate.

This Appendix applies to the assessment of the quality fluctuations of gold concentrates.

B.2 General provisions

B.2.1 The quality fluctuation of the gold concentrate, that is, the degree of unevenness, is determined by the standard deviation of the gold's mass fraction of the increments in the lot, expressed by (σ_w).

B.2.2 The quality fluctuation of gold concentrate is affected by the conditions of production, storage, transportation. It shall carry out the quality fluctuation test regularly.

B.2.3 The test with large lot size shall use not less than 10 lots of the same type of concentrate; the test with small lot size shall be not less than 5 lots.

B.2.4 Follow the sampling and sample preparation requirements as specified in this standard to prepare the sample.

B.3 Test method

B.3.1 For test of large lot size, it shall divide this lot of gold concentrate into at least 10 parts of approximately equal quantity (as shown in Figure B.1). Sequentially number the increments as taken from each part. Then combine the odd-numbered increments of each part as the specimen-A. Combine the even-numbered increments of each part as the specimen-B. Form a pair of analysis specimen, to carry out determination respectively.

Figure B.1 -- Test method for large lot size

B.3.2 For the test of small lot size, it shall sequentially number all increments of a lot. Combine the adjacent two increments or more than two sets of adjacent

Appendix C

(Normative)

Gold concentrate - Test method for calibrating sampling precision

C.1 Scope

This Appendix specifies the test method for the calibration of sampling precision of gold concentrate.

This Appendix is applicable to the calibration of sampling precision of gold concentrates.

C.2 General provisions

C.2.1 Select more than 20 lots of gold concentrate of the same type and different grades for testing. When the tested gold concentrate is less than 20 lots but not less than 10 lots, the large lot shall be divided into several small lots; each small lot shall be tested.

C.2.2 The number of increments required for the test shall be twice the minimum number of increments as specified in Table 1 of this standard. When using the routine sampling work for the calibration test, the sample A and sample B are composed of n/2 increments.

C.2.3 The increment mass shall meet the requirements of the standard.

C.2.4 Sampling method shall be arbitrarily selected from 5.6 for testing.

C.2.5 Determine and analyze the mass fraction of gold in the analytical sample.

C.3 Test method

C.3.1 Sequentially number all increments as taken from the same lot. Combine all odd-numbered increments into sample A. Combined all even-numbered increments into sample B.

C.3.2 Select one of the following two division methods to conduct the test.

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