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PROCEDURE IN THE ANALYSIS OF COPPER (Cu)

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MGB-CAR-FO-GSD-ALSS-002 ØØ (08.30.17)

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PROCEDURE IN THE ANALYSIS OF COPPER (Cu)

1.0 PURPOSE

This procedure details on the complete analysis of Copper (Cu) in mineral ores, soil and other solid samples.

2.0 SCOPE

This procedure is pertinent to solid samples i.e, mineral ores, soil and other solid samples.

3.0 ASSOCIATED DOCUMENTS

3.1 Procedure on Receiving Sample/s
3.2 Procedure Manual on Sampling
3.4 Work Instruction Manual
3.5 Manual on Standard Analytical Procedures of the Mines and Geo Sciences Bureau Laboratory (Revised Edition; Diliman Quezon City; 2001

3.0 DEFINITION OF TERMS

3.1 ***Copper*** - Copper is a chemical element with symbol Cu (from Latin: cuprum) and atomic number 29. It is a soft, malleable, and ductile metal with very high thermal and electrical conductivity. A freshly exposed surface of pure copper has a reddish-orange color. Copper is used as a conductor of heat and electricity, as a building material, and as a constituent of various metal alloys, such as sterling silver used in jewelry, cupronickel used to make marine hardware and coins, and constantan used in strain gauges and thermocouples for temperature measurement.

3.2 ***Analysis*** - a detailed examination of complex material in order to identify its nature or to determine its elemental composition.

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3.3 ***Titration*** - Titration, also known as titrimetry, is a common laboratory method of quantitative chemical analysis that is used to determine the unknown concentration of an identified analyte.

3.4 ***Titrant or titrator*** is prepared as a standard solution of known concentration and volume of titrant reacts with a solution of analyte to determine concentration of the unknown composition of the sample.

3.5 ***Volume*** – measurement of amount of liquid. Usually expressed in milliliter and liter.

3.6 ***Titer*** - A titer is a way of expressing concentration. Titer testing employs serial dilution to obtain approximate quantitative information from an analytical procedure that inherently only evaluates as positive or negative. The titer corresponds to the highest dilution factor that still yields a positive reading.

5.0 RESPONSIBILITIES

5.1 ***Laboratory Technician I/Laboratory Aide***

- 5.1.1 Prepares sample/s for analysis
- 5.1.2 Receives sample/s
- 5.1.3 Releases Report of Analysis

5.2 ***Chemist III***

- 5.2.1 Receives/ sample/s
- 5.2.2 Analyzes sample/s
- 5.2.3 Computes results of analysis
- 5.2.4 Releases Report of Analysis

5.3 ***Chemist IV***

- 5.3.1 Receives sample/s
- 5.3.2 Assigns sample/s for preparation
- 5.3.3 Analyzes sample/s
- 5.3.4 Computes result/s
- 5.3.5 Signs Final Report of Analysis
- 5.3.6 Releases Report of Analysis

5.4 ***Mining Claims Examiner II***

- 5.4.1 Receives sample/s
- 5.4.2 Records essential details of Incoming Sample/s on a Logbook
- 5.4.3 Analyzes sample/s
- 5.4.4 Encodes Reports of Analysis/ses

5.4.5 Releases Report of Analysis

5.5 ***Division Chief***

5.5.1 Affixes sign on Report of Analysis from the Laboratory

6.0 PROCEDURE

6.1 Procedure in the Conduct of Receiving and Analysis of Samples (Code No.: MGB-CAR-QSP-GSD-ALSS-001)

6.2 Chemist IV furnishes Laboratory Technician/Laboratory Aide Request for Analysis for preparation of sample/s for analysis/ses

6.3 Procedure in the Sampling Method (Code No.: MGB-CAR-QSP-GSD-ALSS-006)

6.4 Chemist III/Chemist IV/Mining Claims Examiner II:

6.4.1 Weighs 0.50 gram ground sample in a 500ml Erlenmeyer Flask. Moisten with water;

6.4.2 Adds 20 ml concentrated Nitric Acid (HNO3) and 15 ml concentrated Hydrochloric Acid (HCl);

6.4.5 Digests/Decomposes to smaller volume. Cool.If there is still undecomposed sample, add 5mL HNO3. Digest to small volume and cool;

6.4.6 Adds 10mL HCl. Digest to smaller volume. Cool;

6.4.7 Adds distilled water up to 100-ml mark. Boil solution Cool;

6.4.8 Adds enough concentrated Ammonium Hydroxide (NH4OH) to precipitate Iron (Fe) about 10-15 ml. Boil till slightly ammoniacal. Cool;

6.4.9 Adds a pinch of crystal Ammonium Biflouride (NH_4HF_2) until all Iron dissolved;

6.4.10 Add 20ml of 20% Potassium Iodide (KI) solution and 2-3 drops of 1% Starch solution (solution will turn blackish due to the action of Iodine with starch);

6.4.11 Titrates with corresponding high or low titer Sodium Thiosulfate ($Na_2S_2O_3$) standard until colorless or cream solution;

6.4.12 Computes for percentage (%) Copper(Cu) content.

Computation:

$$\% \text{ Copper (Cu)} = \frac{\text{(Volume of Titer)}}{\text{Weight of sample in gram}}$$

Titer = %-gm/ml

6.5 Chemist IV checks results of analysis and Chemist III prepares report on Test Result Worksheet;

6.6 Mining Examiner II encodes final Report of Analysis;

6.7 Chemist IV affixes signature on the final Report of Analysis;

6.8 Chief Geologist signs the final Report of Analysis;

6.9 Procedure on Barcoding/Releasing of Internal Documents, Communications or Correspondence (Code No.: MGB-CAR-QSP-FAD-DCC-001); and

6.10 Laboratory Personnel release/s Report of Analysis to the Client.

7.0 RECORDS

7.1 Bill of Assessment
7.2 Request for Analysis
7.3 Test Result Worksheet
7.4 Report of Analysis
7.5 Logbook
- 7.5.1 Details of Incoming Samples (Private and Official)
- 7.5.2 Incoming Samples (for Receiving Samples)
- 7.5.3 Instruments/Apparatus Status Used During Analysis
- 7.5.4 Volumetric Determination of Sample/s