# GEOCHEMICAL ANALYSIS OF IRON ORE

## SGS GEOCHEMICAL ANALYSIS FOR IRON ORE EXPLORATION

No matter where you are, what limits of detection, precision or accuracy you require, SGS Minerals Services has the technical expertise to supply chemical analysis for iron ore. We have the locations, technical strength, independence, consistency and ethical compliance you need. Our unmatched network of over 100 commercial labs, sample preparation facilities and mine-site labs are linked to form a uniform global platform that extends into an unparalleled number of countries and mining camps.

Through our unparalleled global network, SGS has the capabilities to provide you with a range of services for geochemical analysis for iron ore including:

- Sample preparation
- Laboratory analysis
- Davis Tube Analysis
- Party (settlement) and umpire analysis

### SAMPLE PREPARATION

Sample preparation is the process by which a sample is readied for analysis. The right sampling method will produce a sub-sample that is representative of the total sample. Good sample preparation practice is essential to obtaining meaningful and reliable analytical data.

SGS is committed to providing preparation procedures that are dedicated to exploration or mining for ores at each of our locations. This involves technologically advanced equipment and, in most cases, physically separated sample processing areas for different sample types. The crushing and pulverizing options available are varied. Your choice can depend on the sample type, size and/or form of the element of interest within the sample matrix. Please consult with our staff for the best possible option for your samples before starting analysis.

During sample preparation, there are many critical points where sample contamination can occur. One such area arises from the type of equipment used. Unfortunately, during sample preparation, contamination can never be avoided. The levels are dependent on sample hardness, crushing and pulverizing time as well as crushing / grinding media used.

### FUSION BY XRF

SGS offers unmatched XRF expertise at many of our operations. Iron ore is common in many mineral forms (hematite, magnetite, goethite, limonite or siderite) and has mineral-specific analysis requirements. Borate fusion with XRF analysis is an extremely robust technique for major and minor elemental analysis in complex mineralization and offers highly precise and accurate results for iron ore samples. This method is not suitable for high sulphide materials >1%. The following package is available at select SGS geochemical laboratories:

XRF78S – Iron Ore Analysis of Majors and Minors by Fusion-XRF

- Majors: $Al_2O_3$, CaO, $Cr_2O_3$, $K_2O$, MgO, MnO, $Na_2O$, $P_2O_5$, $Fe_2O_3$, $SiO_2$, $TiO_2$, LOI and S as $SO_3$
- Minors: Ba, Cu, Ni, Ta, V, Zn, Zr

### THERMOGRAVIMETRIC ANALYSIS

SGS provides thermogravimetric analysis at many of our geochemistry labs globally. Thermogravimetric analysis allows for the determination of Loss on Ignition (LOI) from raw iron ore samples by passing them through a number of furnaces with progressively higher temperatures. The LOI is a measure of the water content of the ore and an important step in iron ore analysis. When ore is fed into a blast furnace, the water contained in it will evaporate. In order to characterize the sample, we must determine the weight loss of the ore at specific temperatures.

### DAVIS TUBE RECOVERY

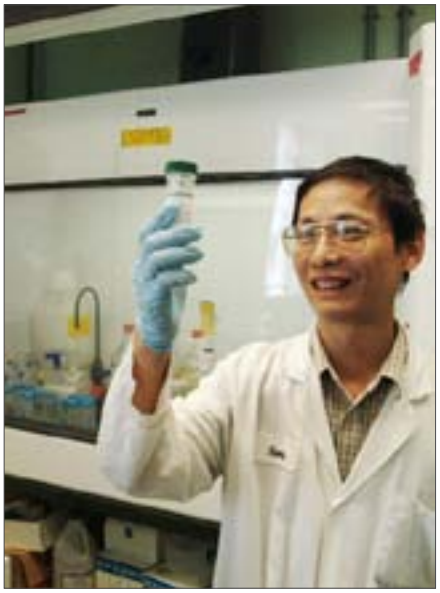
As many iron ores either are magnetite or contain magnetite, the use of Davis Tube Recovery (DTR) is industry standard for the quantitative analysis of the magnetic minerals in the sample. SGS experts will use DTR to determine the magnetic content of your iron ore. Sample material is placed in a glass tube at a 45° angle between 2 powerful electromagnets. A slurry sample is poured through the tube slowly and then the tube is rinsed with water so only a clean concentrate of magnetic material remains. Other geochemical analyses can then be used to further quantify the nonmagnetic content of the ore, providing you with accurate information to forecast potential commercial recoveries.

### PARTY (SETTLEMENT) AND UMPIRE ANALYSIS

SGS Minerals Services laboratories have been performing control, party and umpire assays and analytical determinations of pay and penalty for over 20 years. We have strong, long-term laboratory-client relationships. Commercial transactions are settled on our results, so we know that they must be timely and accurate. Our laboratory uses industry-standard methods and ISO / IEC 17025 quality assurance and quality control practices. Our laboratories are first-rate facilities staffed by experienced technical professionals including a team of research chemists that have the expertise to solve the most daunting sampling and analytical problems.

### QUALITY ASSURANCE

SGS operates a quality assurance program to ensure our data meets international quality standards. Quality assurance standards are constantly monitored through participation in numerous industry and organizational programs, as well as in our own, unique round robin program administered through the Institute for Inter-laboratory Studies. Our lab uses concepts of Total Quality Management (TQM) to ensure consistent operation on a daily basis. TQM is a comprehensive and structured approach to laboratory work that seeks to improve the quality of analysis through ongoing refinements in laboratory processes based on continuous quality feedback.



SGS continually monitors analytical processes through the application of statistical process control (SPC). SPC involves plotting the results of chemical processes and using statistical methods to monitor, evaluate, and predict process behaviors. SPC is an effective tool that determines if process results are outside either the acceptable range for the chemical process or outside the quality standards our labs adhere to. Problems are detected and remedied promptly to ensure analytical accuracy.

### INTERNAL QUALITY CONTROL

All SGS laboratories have formally documented QA/QC procedures and data acceptance systems that are contained in on-site Quality and SOP manuals. Where the laboratories are accredited or going through the accreditation process these documents have been audited repeatedly by international quality authorities as part of the ISO/IEC 17025 accreditation held by many SGS laboratories.

## CONCLUSION

SGS provides unmatched analytical services to all aspects of the minerals industry. Our Centres of Excellence are ISO / IEC 17025 accredited for specific registered tests and most of our major regional facilities are ISO 9001 certified. Regardless of the stage of your project, SGS geochemists perform quality, rapid-turnaround analyses targeting a wide variety of elements in many types of sample matrices. We have firmly committed to advanced technology, and this commitment ensures we can deliver on our promise to provide benchmark-setting services.

### CONTACT INFORMATION

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