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PROCESS FOR ABSORPTION OF UNDESIRABLE GASEOUS EFFLUENTS

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ABSTRACT OF THE DISCLOSURE

A process for the absorption of undesirable acidic gaseous effluents produced during the treatment of ores. The undesirable acidic gases, such as hydrogen sulfide, are introduced into an alkaline slurry grinding operation and absorbed therein thus eliminating the need for separate absorption columns or scrubbers.

DETAILED DISCLOSURE

This invention relates to a process for the absorption of undesirable gaseous effluents. More particularly, it relates to a process for the control and elimination of noxious acidic air pollutants, such as hydrogen sulfide and other acidic gases, which may be generated during the treatment of ores for the recovery of valuable mineral constituents. Noxious acidic gases may be evolved from a number of sources. For example, hydrogen sulfide may be evolved in the acid leaching of mineral bearing uranium ore. Hydrogen sulfide is also found in the flue gas of a furnace distilling sulfur from molybdenite flotation concentrate. Similarly, sulfur dioxide occurs in the flue gas of a dryer or roaster or other metallurgical furnace. Additional acidic gases which can be absorbed by the process of the present invention include hydrogen cyanide, hydrogen chloride, carbon dioxide, ethylene, nitric dioxide, etc.

In the metallurgical treatment of ore, for example, copper ores, it is known to apply a leach-precipitation-flotation process such as that described in U.S. Pat. No. 3,168,396, wherein sulfide reagents are added to acidic ore slurries. In this process, hydrogen sulfide is generated, some of which escapes from the process slurry stream into the plant atmosphere. As is well known, hydrogen sulfide is corrosive to plant equipment and, as a result of its characteristic odor, is highly offensive to personnel. Additionally, hydrogen sulfide, in high concentrations presents a health hazard. Noxious gases such as hydrogen sulfide may be collected from process vessels by means of hoods and ducts and conveyed to absorption columns or scrubbing towers where the hydrogen sulfide is removed from the carrier gas or air by absorption in liquid or solid chemical absorbents. Among the chemical absorbents which have been employed for this purpose are caustic soda (sodium hydroxide), soda ash (sodium carbonate), ammonium hydroxide, aliphatic amines and potassium permanganate. However, for an absorption column or scrubbing tower to remain effective, it is necessary to remove periodically or continuously all or a portion of the chemical absorbent and replace such absorbent with fresh or regenerated chemicals. The spent chemical absorbent must either be discraded or directed to a stripping system in which the noxious chemical is removed and the chemical absorbent regenerated for

return to the absorption column. Under appropriate conditions, where the nature and quantity of the noxious gas are such that some form or product of it can be sold to offset a portion or all of the operating cost, the use of absorption columns may be desirable since they are highly effective when properly designed.

However, in metallurgical operations, the amount of the noxious gases to be absorbed are ordinarily insufficient to justify the production of a saleable noxious gas by-product. Furthermore, absorption column devices are characterized by relatively high capital costs, continuing charges for the replacement or regeneration of the chemical absorbent, operational problems resulting from the precipitation of solids in the absorption column or scrubber and continuing charges for operating and maintenance labor.

In the metallurgical treatment of ores, such as copper bearing ores, it is known to moisten the ore with an aqueous acid solution to convert the metal values to a soluble salt of the metal. A sulfide precipitant is added to the leach slurry so formed. During this leach-precipitation process noxious hydrogen sulfide is generated and the portion which escapes from the slurry is normally removed through ducts and fans to an absorption column or scrubber where chemical absorbents separate the noxious gases from the carrier air. The ore slurry itself is directed to a wet grinding mill, such as a ball mill or rod mill, where the slurry is ground with added lime to form an alkaline ore slurry in preparation for subsequent beneficiation by the flotation process. In accordance with my invention, I have discovered that the noxious acidic gases, such as hydrogen sulfide, may be absorbed without the use of absorption columns or scrubbers by directing the noxious gas into a grinding mill, which may be of the ball, rod pebble or autogenous type where it will be absorbed by the alkaline slurry present in the mill.

It is therefore an object of the present invention to provide a process for the absorption of undesirable gaseous effluents which does not require the use of conventional absorption columns or gas scrubbers.

A further object of the invention is to provide a process for the absorption of undesirable gaseous effluents in which the undesirable effluents are absorbed in portions of the process equipment required to perform other necessary parts of the metallurgical process.

A still further object of the invention is to provide a process for the absorption of undesirable gaseous effluents in which the undesirable effluent is absorbed during the wet grinding of an ore slurry.

A further object of the invention is to provide a process for the absorption of undesirable gaseous effluents in a wet grinding process so that the gas moving equipment following the wet grinding equipment need not incorporate acid proof ducts, blowers and the like, whereby the cost of the auxiliary equipment may be substantially reduced.

Further objects and advantages of the present invention will be apparent to those skilled in the art from the present description and the accompanying drawings, in which:

FIG. 1 is a block diagram illustrating schematically the treatment of ore as heretofore practiced including a leach-precipitation step, a noxious gas absorption step, and a wet grinding step to produce an ore slurry suitable for subsequent beneficiation;