METALLURGICAL AND MINING ENGINEERING (MEM)

MEM 8301   Ignacio, Ma. Teresa T. (MS Met. Eng'g.)
            The flotation response of chromite gravity
            concentration tailings to anionic sulfonate
            collectors.
            1983.

    The recovery of chromite from the tailings of the
gravity concentration tables is studied using flotation
method. The parameters involved are the dosages of two
sulfonate collectors, sodium fluoride, and sodium silicate
at two levels of pH. Test are conducted using 2^5 full
factorial design and central composite design.
    The maximum recovery obtained was 83.29% with a
chromium content of 16.38 per cent (23.91% Cr_2O_3), at pH 5
with large dosages of AP845 (5.0 kg/MT), sodium fluoride
(1.82 kg/MT) and sodium silicate (3.2 kg/MT).

MEM 8502   del Rosario, Antonio Jr. F. (MS Met. Eng'g.)
            Media wear in grinding Philippine sulfide ore.
            1985.

    Batch grinding tests were performed on a sulfide ore
to determine the mechanical and corrosive wear components of
wet grinding media wear. The results of the tests resolved

the wet grinding media wear to 46 percent mechanical wear
and 54 percent corrosive wear.

Industrial corrosion inhibitors were tested to
determine whether wet grinding media wear could be reduced
by controlling corrosion. The inhibitors used were lime,
sodium nitrite, sodium silicate, and sodium benzoate. The
reduction in grinding media wear ranged from 11 to 38
percent.

screen analysis performed on the ground material of
the inhibitor tests indicated that the inhibitors did not
have any effect on the size distribution of the ground
materials.

Sulfide bulk flotation tests performed on the slurries
obtained from the inhibitor tests showed that lime, sodium
nitrite, and sodium silicate did not have any effect on the
recovery of copper. Sodium on the otherhand has a negative
effect on the recovery of copper.

MEM 8703   Amorsolo, Alberto Jr. V., (MS Met. Eng'g.)
            A study on the prediction of the effective diffusivity
            of gas through porous media from the pore structure.
            1987.

The effectiveness diffusivity of gas through various
types of porous media ranging from carbons (metallurgical
and formed cole, electrode graphite and dense graphite) to
hydrogen-reduced sponge iron and glass filter was predicted
from three equations derived from the random pore model, the
parallel pore model and the idea pore structure model. Pore
structure data used in the three prediction equations were
the total void fraction, the fraction of connected
macropores, the average effective pore radius and the
relative Darcy permeability constant. Results showed that
the experimental De values agreed well with the predicted
values using any of the models cited for the glass samples.
For the other materials investigated, the agreement was not
as good, most probably due to the presence of micropores and
other pore shapes not considered by the models.

MEM 8704   Golecruz, Renato B. (MS Met. Eng'g.)
             The reduction behavior of nickel in high-iron
             laterites under $CO/CO_2/N_2$ atmospheres.
             1987.

        The behavior of nickel in high-iron laterite during
selective reduction was studied. It was observed that the
metal recovery increases with increasing level of any
process variable, reaches a peak value, and then declines
with further increase in severity of reduction conditions.
It was also noted that within a certain range of conditions
and degree of reduction, this same recovery tends to vary
linearly with weight-loss. X-ray diffraction analysis of
selected products revealed that some spinel remains
resistant to eduction even at the strongest conditions.
Incorporating this observation to the so-called
recrystallization theory, the decline in metal recovery is
explained as due to the redissolution of a fraction of
metallized nickel in increasingly refractory spinel as the
latter recrystallizes to wustite.

MEM 8805   Olmos, Edwin L. (MS Met. Eng'g.)
             Flotation responses of a low-grade manganese ore.
             1988.

        This work investigated the effects of certain
flotation test parameters on the recovery of a Palawan low-
grade manganese ore sample. The zeta potential values of
the sample under flotation conditions were also determined
using a fabricated streaming potential measuring set-up.

        Flotation test results showed that finer feedsizes,
scrubbing and desliming of feed, use of crude fatty acid
(i.e. oleic acid) as collector, acidic pulp pH, and shorter
conditioning time have positive effects on the flotation
recovery of manganese. Furthermore, results revealed that
collector and modifier dosages, as well as pulp pH have
direct effects on the zeta potential of the ore sample.
Possible surface mechanisms were proposed to explain these

observations.

Finally, some form of correlation between the zeta potential values and flotation recoveries was observed from the test results of this investigation. The correlation showed that negative zeta potential values were mostly found to occur with medium to high flotation recoveries, while positive zeta potential values were mostly associated with low flotation recoveries.

MEM 8906   Calata, Jesus Noel Jr. A., (MS Met. Eng'g.)
            The electrochemistry of the corrosion of grinding
            media in Philippine sulfide ore slurries.
            1989.

Polarization measurements were conducted using Armco M-25 split grinding balls as working electrodes. A rotating electrode set-up was used. Tests for localized corrosion following the procedure in ASTM G 61 were also made.

The calculated corrosion rates in supernatant solution from ore-tap water slurry were much higher. Average corrosion current densities of 20.6, 103.7, and 217.4 IA/cm^2 were obtained for static, stirring and abrasion conditions, respectively. Stirring also resulted in more noble potentials while abrasion produced more negative potentials indicating an interaction between abrasion and corrosion.

The addition of lime to the test solution also drastically reduced the corrosion rates. The corrosive rate was reduced by 82 percent for the abraded electrode while a corresponding reduction of 99.7 percent was realized in stirring conditions with a dosage of 500 g/MT ore. Increasing the lime dosage did not produce any further significant reduction.in corrosion rate.

The tests for susceptibility to localized corrosion indicated a breakdown potential which is more noble by about 0.16V than the corrosion potential. The relative closeness of the breakdown potential to the corrosion potential suggests that the alloy is susceptible to pitting corrosion which may be obscured in actual grinding conditions because of the effect of abrasion of the grinding media surface.

MEM 9107   **Abellana, Virgilio Y. (MS Mem. Eng'g.)**
            Computer modelling of batch annealing process for low
            carbon steel.
            1991.

        A computer model of batch annealing process of low
carbon steel which could predict hardness given the desired
furnace settings, gas properties and the initial properties
of the steel strip before it was annealed, was developed for
the   batch   annealing   facilities   of   National   Steel
Corporation.
        The metallurgical aspects of the process and the heat
transfer   mechanisms   involved   were   first   investigated
conducted literature research.   Factorial experiments were
conducted   at   the   laboratory   to   find   mathematical
relationships among these annealing factors; 1)   heating
rate, 2)   soaking temperature, 3)   soaking time, and 4)
cooling rate.   Evaluation of the results of the experiments
showed that heating rate and cooling rate have less
significant effect on the hardness after annealing.   Soaking
temperature had the greater effect than soaking time.
        Regression experiments were then conducted to find
better   mathematical   relationship.   The   resulting
mathematical relationship of hardness versus soaking
temperature and soaking time was:

hardness =   228.8 - 1.548 * soaking temp (°C)
             - 4.594 * soaking time (minutes)