Production of Titanium Powder Directly from Titanium Ore

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Introduction
- Current status of industrial production of Ti powder
- World production of Ti sponge (2005)

Experimental results 1
- Expt: CD-2, Rcat/mol = 0.2, t′ = 10 h

Experimental apparatus for the reduction process
- Flowchart of the PRP
- Sintered feed preform
- Reduction
- Leaching
- Waste solution
- Powder drying

Experimental conditions
- Cationic mole ratio: Rcat/mol
- Temperature (°C): Treak, Tcalc, Tred
- Temperature (°C): Treak, Tcalc, Tred
- Reduction

Experimental results 2
- SEM images of obtained Ti powder

Analytical results of the obtained Ti powder
- Expt No. 1

Expt No. 2

Discussion

Conclusion
- The feasibility of the preform reduction process (PRP), based on the calcothermal reduction of natural Ti ore, was demonstrated.

- It was experimentally demonstrated that high-purity Ti powder (greater than 99%) was obtained directly from natural Ti ore (rutile ore) by the PRP.

- Iron was successfully removed by selective chlorination during the calcination step.

- When C powder was added to the preform, iron was removed more efficiently, and Ti powder with a purity of 98% was obtained. Currently, a more effective method for the direct removal of iron from Ti ore is under development.

- Detailed mechanism of selective chlorination is also under investigation.