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The novel hydroelectrometallurgical technology of simultaneous production of metallic manganese, electrolytic manganese dioxide and manganese sulfate monohydrate

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The novel hydroelectrometallurgical technology is developed to simultaneously production of electrolytic metallic manganese, electrolytic γ-MnO_2 and $MnSO_4 \cdot H_2O$ in one technological cycle. The united, complex technological scheme consists of two technological lines. One of these lines is designed for: By sulfuric acid leaching of MnO containing primary products formed by high thermal reduction of manganese oxide ores; Purification from Fe^{3+}, Ni^{2+}, Co^{2+} and other heavy metals cations by hydrolysis (pH_4) and adding Na_2S into the $MnSO_4$ solution; Crystallization of $MnSO_4 \cdot H_2O$ after treatment of concentrated $MnSO_4$ solution in autoclave under high temperature condition; Supply of hot, autoclave outlet solution of $MnSO_4$ to anodic area (anodic area is separated by anionic membrane to prevent flow of NH^{4+} into anolyte) where γ-MnO_2 is deposed on the anode. The second technological line is designed for: Purification of solution prepared from MnSO4·H2O produced in the autoclave and technical $(NH_4)2SO_4$ by $(NH_4)2S$ and supply of purified solution to the cathodic area of the same reactor where metallic Mn is deposed on the cathode. In accordance with presented technological scheme, optimal technological parameters are determined for $MnSO_4 \cdot H_2O$ and 50-55 g·l-1 Mn^{2+}containing solutions obtained by autoclave treatment of concentrated clean solution of $MnSO_4$ (115 g·l-1 Mn^{2+}) produced after processing of manganese oxide ore. The technological novelty also is exploitation of heat pump to maintain 35-380C in catholyte and 92-940C in anolyte in an electrochemical reactor working under 20A load and divided by anionic membrane (AMI 7001S). As a cooling agent of heat pump, R-600a (isobutane) was chosen. The evaporator of the heat pump was immersed into the catholyte and the condenser - into the anolyte. The effectiveness of heat pump was also determined .

Recent Publications:

1. G. Tsurtsumia, D. Gogoli, N. Koiava, I. kakhniashvili, N. Jokhadze, T. Lezhava, N.Nioradze, D.Tatishvili. (2017) Electrodeposition and Characterization of Mn-Cu-Zn Alloys for Corrosion Protection Coathing. IOP Conf. Series: Earth and Environmental Science 95 042035.
2. P. Nikoleishvili, G. Gorelishvili, V. Kveselava, G. Tsurtsumia, N. Nioradze, R. Kurtanidze, D. Dzanashvili. (2017) Hydrogen generation by reforming of sodium hypophosphite on cobalt-boron oxides containing catalyst. Green and Sustainable Chemistry, 7, pp. 85-93.
3. G. Tsurtsumia, N. Koiava, D. Gogoli, I. Kakhniashvili, T. Lejava, N. Jokhadze, E. Kemoklidze. (2016) Study of the Influence of the Electrolysis Parameters on Mn-Zn, Mn-Cu, Mn-Cu-Zn Alloys Coatings from Electrolytes Containing Complexing ligands. J. Chem. Chem. Eng. 1 13-27.
4. G. S. Tsurtsumia, N. S. Koiava, N. S. G. G. Gogishvili ,I.T.Zaridze, , I. B. Kakhniashvili, G. G.Gorelishvili, , V. M. Kveselava, P. N.Nikoleishvili. (2015) Simultasneoues Prodaction of Electrolytic Metallic Manganese and Electrolytic Manganese Dioxide in an AMI 7001S Anion Exchange Membrane Electrochemical Reactor. J. Electrochemical Society, 162, (8) E96-E103
5. P.O. Nikoleishvili, G.S. Tsurtsumia, V.M. Kveselava, G.G. Gorelishvili, R.R. Kurtanidze, D.T. Sharabidze, and D. I. Dzanashvili. (2015) Using Hydrogen Obtained by Reforming of NaBH4 on Modified Cobalt Catalyst in Hydrogen-Oxygen Fuel Cell. Russian J. Electrochemistry, Vol. 51, No. 7, pp. 665-671.

Biography

Gigla Tsurtsumia got his PhD from Karpov Physico-Chemical Institute in 1977, Moscow, Russia. His interest is related to electrochemical technology of production of manganese and its compounds, electrodeposition of alloy coatings and fuel cells. He published more than 40 papers and got 6 patents.

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