

**O‘ZBEKISTON RESPUBLIKASI
OLIY TA’LIM, FAN VA INNOVATSİYALAR VAZIRLIGI**

NAMANGAN MUXANDISLIK TEXNOLOGIYA INSTITUTI



**«TA’LIM, FAN VA ISHLAB CHIQRISHNING DOLZARB
MUAMMOLARI»
MAVZUSIDAGI RESPUBLIKA ILMIY – AMALIY
KONFERENSIYA**

MATERIALLARI TO’PLAMI



Namangan 2023 yil 7-8 noyabr

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«Ta'lim, fan va ishlab chiqarishning dolzarb muammolari» mavzusidagi respublika ilmiy-amaliy anjuman materiallar to'plami (2023 yil 7-8 noyabr).

Anjuman materiallari to'plami professor-o'qituvchilar, katta ilmiy xodimizlanuvchilar, mustaqil tadqiqotchilar, magistrantlar hamda talabalar uchun mo'ljallangan.

Mazkur to'plamga kiritilgan materiallarning mazmuni, undagi statistik ma'lumotlar va me'yoriy hujjatlar sanasining to'g'riligi hamda tanqidiy fikr mulohazalarga nashriyot va tashkiliy qo'mita javobgar emas. Mualliflarning o'zlari mas'uldirlar!

Ilmiy maqolalar mualliflarning matni asosida chop etildi.

DEVELOPMENT OF TECHNOLOGY FOR PRODUCING FERROUS SULFATE BASED ON IRON WASTE

Hafizov A.A., Sharipov M.S.

Bukhara state university,

m.s.sharipov@buxdu.uz

Annotatsiya: *Maqolada temir chiqindilari asosida temir(II) sulfati olish jarayoni prinsipial texnologiya ishlab chiqish imkoniyatlari tahlil etiladi.*

Kalit so'zlar: *chiqindi, kislota, temir sulfat, texnologiya, kristallogidrat.*

Аннотация: *В статье проанализированы возможности разработки принципиальной технологии процесса получения сульфата железа(II) на основе железных отходов.*

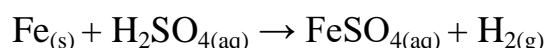
Ключевые слова: *отход, кислота, железа, технология, кристаллогидрат.*

Abstract: *In the thesis analyzes the possibilities of developing the principle technology of the iron(II) sulfate obtaining process based on iron waste.*

Key words: *waste, acid, iron sulfate, technology, crystalline hydrate.*

Especially in recent years, a ferric sulfate solution has occupied the attention as a useful water treatment agent and, particularly, a ferric sulfate solution and a basic ferric sulfate solution have a quick sedimentation speed for the resulting flocs and show good deodorizing ability as compared with a water treatment agent of an aluminum type such as an aluminum sulfate solution and a basic aluminum chloride solution whereby they have been widely used as a water treatment agent for waste water from paper manufacturing industry, from food industry, from chemical industry, leather industry [1]. Etc. or as a dehydrating aid for sewage sludge. It also used in dyeing as a mordant, pigments, and in pickling baths for aluminum and steel. Medically it is used as an astringent and styptic [2].

Iron is a fairly active metal and can easily displace hydrogen from mineral acid solutions [3]. It reacts vigorously and exothermically with sulfuric acid to produce iron (II) sulfate:



The purpose and task of the research is to develop the technology for the production of iron sulfate salts. For this purpose used iron filings and sulfuric and hydrochloric acid were used for this purpose. Processes of dissolution of ferric

waste in acid are well studied [4]. Process of syhtesis of FeSO₄ shown in figure 1.

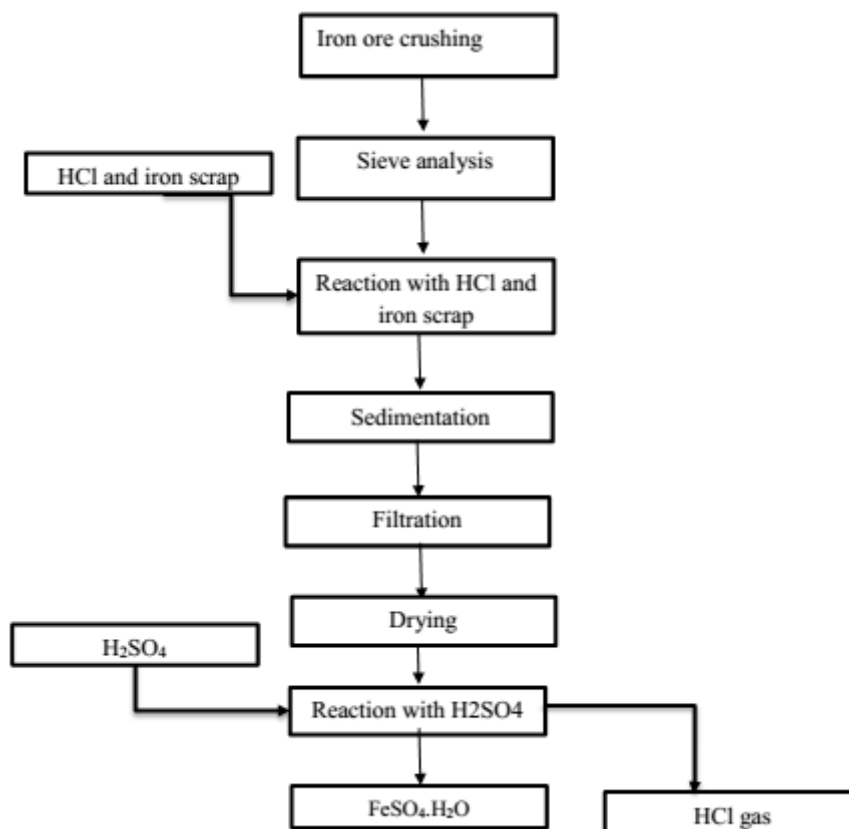
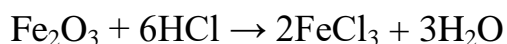


Fig.1. Scheme of obtaining of iron sulfate crystals

First iron ore and hydrochloric acid was reacted to give ferric chloride. Then some amount of iron scrape is added to get ferrous chloride. The next reaction was done using water bath. The measured amount of iron chloride were placed in the jar at available temperature. Then sulfuric acid was titrated. At that moment the byproduct of the reaction (hydrochloric gas) was pass through the pipe and dissolve in water. The ore from Horo Guduru were crushed in jaw crusher and motor mill with a particle size of < 2mm. Then the crushed sample was divided in three different groups depending on particle size. Then, the crushed and sieved ore were placed in the beaker with concentrated (35%) hydrochloric acid.



Then unreacted solid ore and ferric chloride was separated by sedimentation followed by a vacuum filtration. If we react ferric chloride directly with sulfuric acid it gives ferric sulfate. So first we put equivalent amount of porous mass of iron scrap in the solution, and the ferric chloride (FeCl₃) is reduced to ferrous chloride (FeCl₂)

in accordance with the following exothermic reaction:



Then FeCl_2 solution was dried in the oven. After drying ferrous chloride crystals was crushed and react with sulfuric acid. The mixture of the powdered sample and acid were heated at constant temperature of (50°C, 75°C, 95°C) for 30, 60, 90 minutes to produce iron sulfate. Found optimal mode for leaching iron-containing metal waste was tested in an enlarged laboratory scale and proposed a basic technological diagram for obtaining iron sulfate. Crystals shown in figure 2.



Figure 2. Iron sulfate crystals drying forms

Drying the solution produces green vitriol: blue-green crystals of $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$. Air oxidizes iron (II) salts to iron (III), and the crystals are soon crusted with brown iron (III) hydroxides and sulfates.

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