VOL. 1 NO. 4 (2022)
ISSN: 2181-3132
YOSH TADQIQOTCHI JURNALI
2nd Sun

TECHNOLOGY OF EXTRACTION OF IRON OXIDE FROM IRON-CONTAINING WASTE

Aripova Mastura Xikmatovna
Shamatov Sirojiddin Abdujalilov
Muhamadjonova Mohina Nodirjon qizi

https://doi.org/10.5281/zenodo.6590853

ABSTRACT: The article describes the scheme of obtaining pyrite from iron ore of a copper concentrator, Fe $(OH)_3$ and Fe_2O_3 by heating, production methods, cost-effective products and areas of application.

Key words: pyrite, sodium hydroxide, iron(II) hydroxide, iron (III)oxide, inceniration.

Introduction: The content of this work is that copper concentrators today contain many compounds in the iron-containing wastes generated during flotation, and their separation can increase economic efficiency. There is a growing demand for iron and its compounds in Uzbekistan: sulfate compounds of iron, pigments containing iron, iron powder. however, if this process is applied on a production scale, it will be possible to create more jobs.

World prices for iron and its compounds today Iron

Iron compaunds	Quantity,t	PriceFe
Fe	1	94.97$
$FeSO_4$	1	70-90$
$FeSO_4*7H_2O$	1	60-90$
$Fe_2(SO_4)_3$	1	90-199$
FeS_2	1	300$

World iron production

	Russia,(t)	America,(t)	Uzbekistan,(t)
Fe	95 mln.	46.9 mln.	450-500 thousand

Experiment section. For the experiment, 3 samples of man-made iron-containing (35-45%) man-made waste from the copper concentrator-2 plant of JSC "Almalyk MMC" were prepared on an analytical balance of 120 g.

$FeS_2 + 2NaOH = Fe(OH)_2 + Na_2S + S$

$FeS + 2NaOH = Fe(OH)_2 + Na_2S$

$SiO_2 + 2NaOH = Na_2SiO_3 + H2O$

based on the reactions, 80 g of NaOH was extracted and a charge was prepared. The muffle furnace was brought to a temperature of 100 ^oC and the samples were fired in hot-resistant crucibles at 350-400-450 ^oC for 40-50-60 minutes.

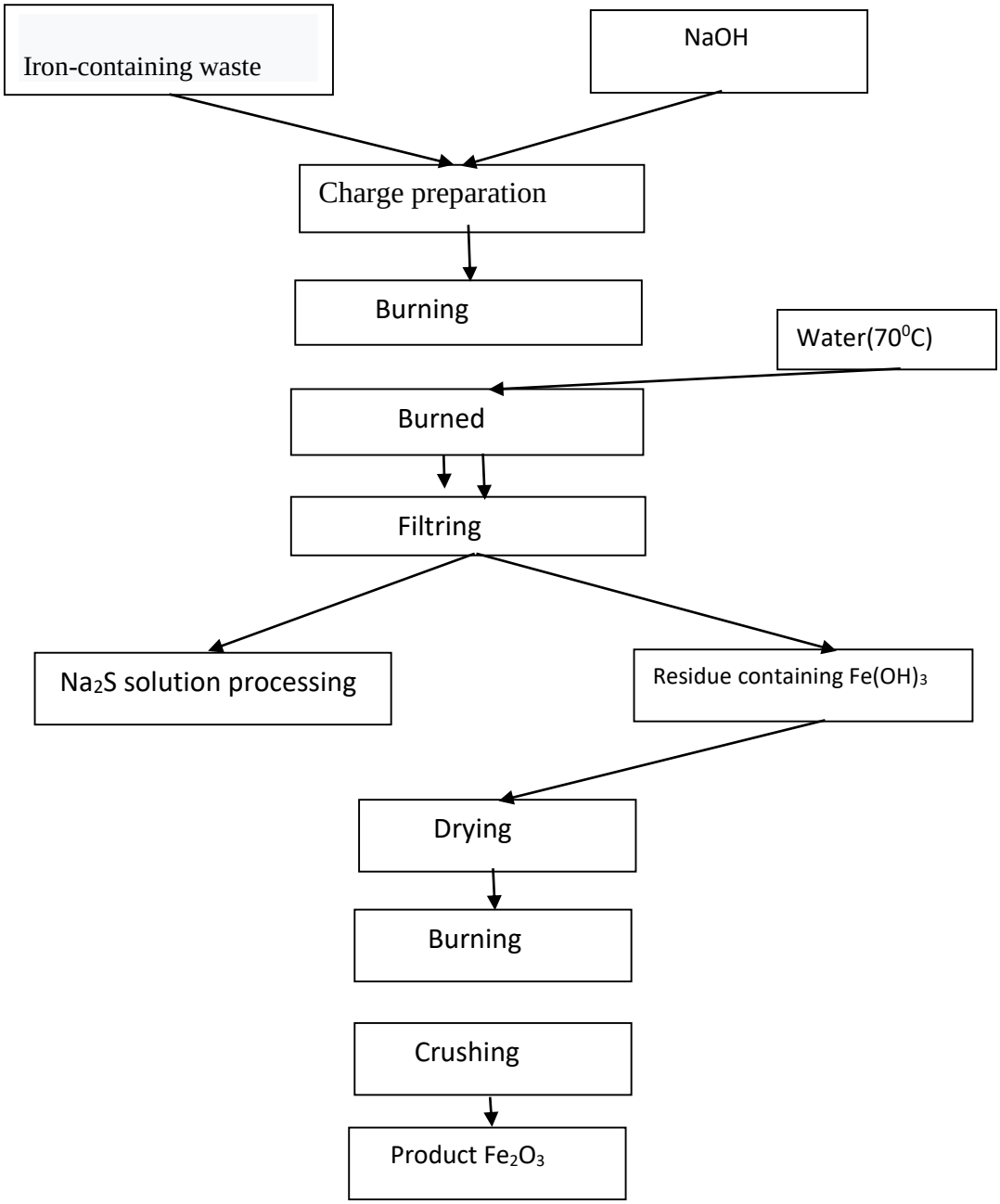
$2Fe(OH)_2 + 1 / 2O2 = Fe_2O_3 + 2H_2O$

The burns were then cooled to room temperature. When the burns are dissolved in 300 ml of distilled water at 70 ^oC:

$Fe_2O_3 + 3H_2O = 2Fe(OH)_3$

Iron (III) hydroxide was precipitated. Na_2S enters the solution. Then $Fe(OH)_3$ solution was passed through a filter paper. The solution passed through the filter paper is 128.32 g. Add the prepared solution to 64.16 g of dilute and concentrated sulfuric acid solution. when formed, silicate salts were formed.

Technological scheme of processing of iron-containing waste



The results of the analysis of the obtained samples. Picture 1.

Analyzed result

Sample Information

Sample name	Fe2O3 Sirojiddin
File name	Fe2O3 Sirojiddin
Application	Umumiy.
Date	2021/ 6/ 1 17:40
Analyzed by	
Counts	1
Comment	

Analyzed result(FP method, Scatter)

No.	Component	Result	Unit	Stat. Err.	LLD	LLQ
1	Cl	0.162	mass%	0.0005	0.0002	0.0007
2	MgO	0.131	mass%	0.0103	0.0233	0.0699
3	SiO2	0.0822	mass%	0.0018	0.0014	0.0043
4	SO3	0.133	mass%	0.0011	0.0014	0.0042
5	Cr2O3	0.0626	mass%	0.0021	0.0044	0.0133
6	MnO	0.362	mass%	0.0046	0.0065	0.0195
7	Fe2O3	95.6	mass%	0.0449	0.0024	0.0071
8	Co2O3	0.179	mass%	0.0110	0.0355	0.107
9	NiO	0.0163	mass%	0.0016	0.0033	0.0100
10	CuO	0.0630	mass%	0.0020	0.0015	0.0044
11	Ga2O3	0.0030	mass%	0.0004	0.0008	0.0024

Spectrum

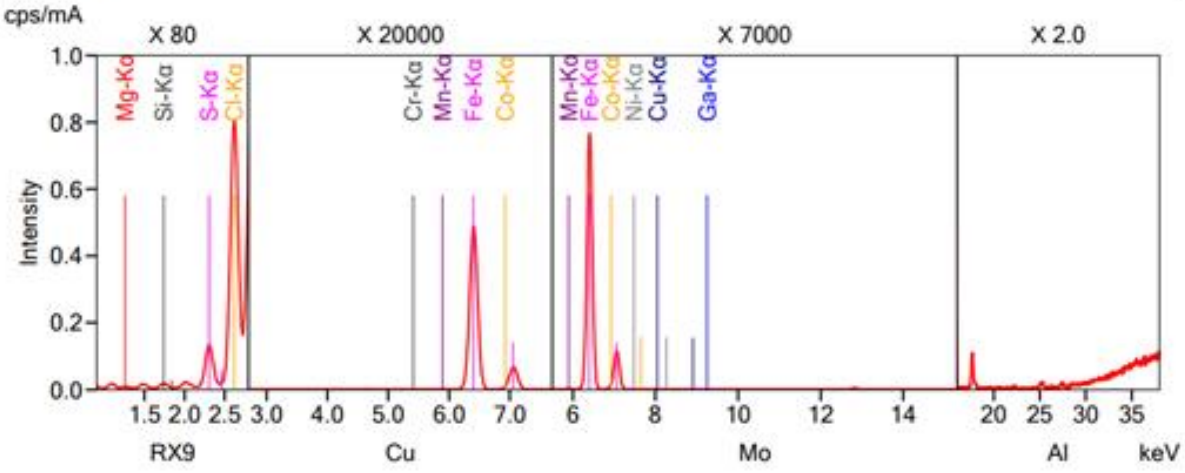


Figure 1 shows the results of the obtained pigment in the form of an oxide in an X-ray fluorescent spectrum analyzer.

Picture 2

Analyzed result

Sample Information

Sample name	Fe2O3 Sirojiddin
File name	Fe2O3 Sirojiddin
Application	Umumiy.
Date	2021/ 6/ 1 17:40
Analyzed by	
Counts	1
Comment	

Analyzed result(FP method, Scatter)

No.	Component	Result	Unit	Stat. Err.	LLD	LLQ
1	Cl	0.193	mass%	0.0006	0.0003	0.0008
2	Mg	0.0932	mass%	0.0073	0.0166	0.0497
3	Si	0.0456	mass%	0.0010	0.0008	0.0024
4	S	0.0637	mass%	0.0005	0.0007	0.0020
5	Cr	0.0524	mass%	0.0017	0.0037	0.0111
6	Mn	0.342	mass%	0.0044	0.0061	0.0184
7	Fe	81.8	mass%	0.0425	0.0020	0.0061
8	Co	0.154	mass%	0.0095	0.0309	0.0927
9	Ni	0.0154	mass%	0.0016	0.0034	0.0101
10	Cu	0.0616	mass%	0.0019	0.0015	0.0044
11	Ga	0.0027	mass%	0.0004	0.0007	0.0022

Spectrum

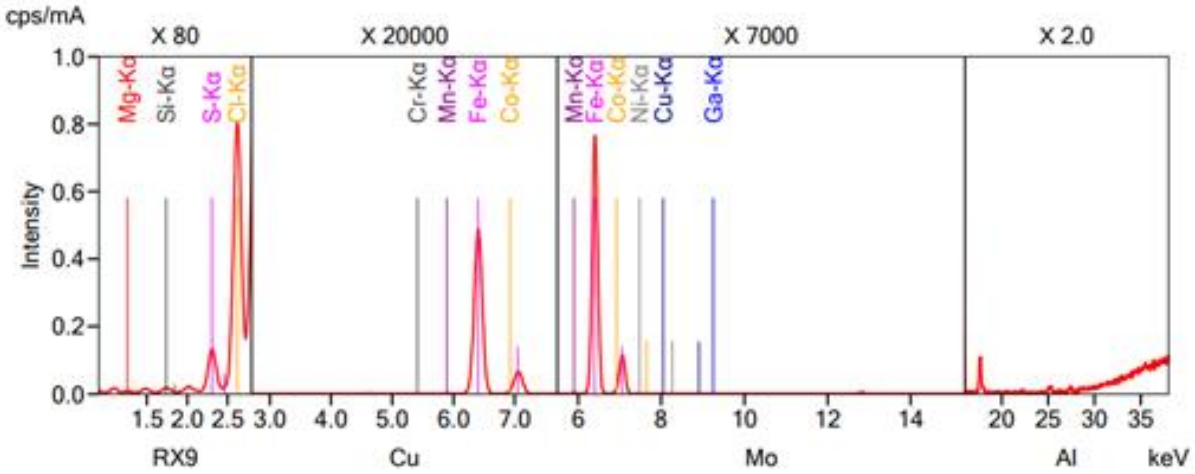


Figure 2 shows the results of the elemental composition of the obtained pigment in the X-ray fluorescent spectrum analyzer.

Picture 3

Analyzed result

Sample Information

Sample name	Sirojiddin. FeSO4
File name	Sirojiddin. FeSO4
Application	Umumiy.
Date	2021/11/ 3 11:21
Analyzed by	
Counts	1
Comment	

Analyzed result(FP method)

No.	Component	Result	Unit	Stat. Err.	LLD	LLQ
1	Al2O3	0.467	mass%	0.0150	0.0315	0.0944
2	SiO2	0.201	mass%	0.0060	0.0128	0.0384
3	SO3	38.8	mass%	0.0271	0.0004	0.0013
4	Cr2O3	(0.0061)	mass%	0.0013	0.0038	0.0113
5	MnO	0.190	mass%	0.0031	0.0046	0.0139
6	Fe2O3	59.4	mass%	0.0417	0.0014	0.0042
7	Co2O3	0.129	mass%	0.0069	0.0202	0.0607
8	NiO	0.0114	mass%	0.0009	0.0017	0.0050
9	CuO	0.0394	mass%	0.0012	0.0012	0.0035
10	ZnO	0.117	mass%	0.0016	0.0006	0.0019
11	SrO	0.0022	mass%	0.0001	0.0002	0.0007
12	ZrO2	0.635	mass%	0.0065	0.0015	0.0046
13	Ag2O	0.0032	mass%	0.0005	0.0008	0.0023
14	SnO2	0.0079	mass%	0.0008	0.0013	0.0040
15	TeO2	(0.0048)	mass%	0.0009	0.0021	0.0062
16	Ta2O5	(0.0078)	mass%	0.0023	0.0065	0.0194

Spectrum

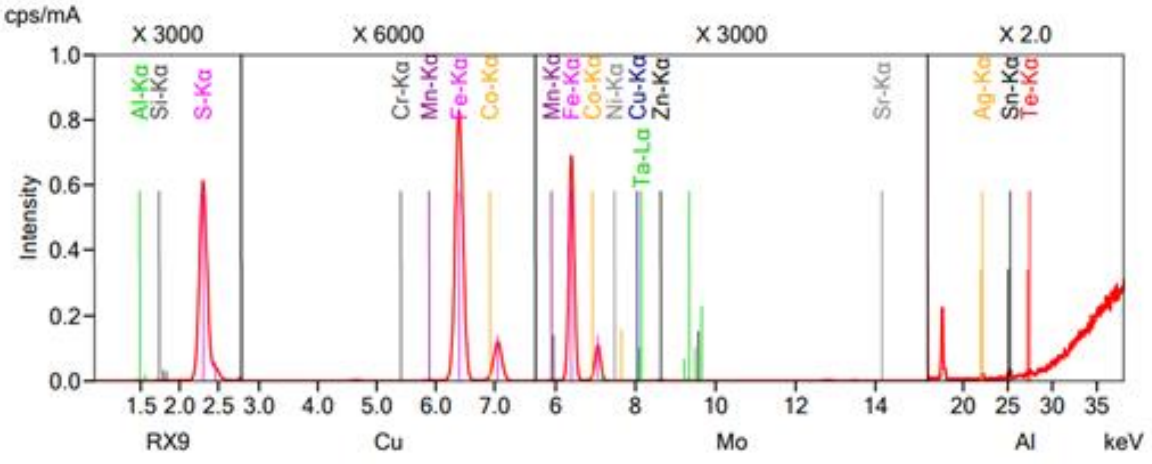


Figure 3 shows the oxide results of the iron sulphate obtained in the X-ray fluorescent spectrum analyzer.

Picture 4

Analyzed result

Sample Information

Sample name	Sirojiddin. FeSO4
File name	Sirojiddin. FeSO4
Application	Umumiy.
Date	2021/11/ 3 11:21
Analyzed by	
Counts	1
Comment	

Analyzed result(FP method)

No.	Component	Result	Unit	Stat. Err.	LLD	LLQ
1	Al	0.366	mass%	0.0117	0.0246	0.0739
2	Si	0.138	mass%	0.0042	0.0091	0.0273
3	S	24.2	mass%	0.0184	0.0003	0.0008
4	Cr	(0.0074)	mass%	0.0016	0.0045	0.0134
5	Mn	0.254	mass%	0.0042	0.0062	0.0186
6	Fe	73.6	mass%	0.0377	0.0017	0.0051
7	Co	0.182	mass%	0.0088	0.0255	0.0766
8	Ni	0.0178	mass%	0.0014	0.0026	0.0078
9	Cu	0.0626	mass%	0.0018	0.0019	0.0056
10	Zn	0.187	mass%	0.0025	0.0010	0.0030
11	Sr	0.0037	mass%	0.0002	0.0004	0.0012
12	Zr	0.937	mass%	0.0096	0.0023	0.0068
13	Ag	0.0058	mass%	0.0009	0.0014	0.0043
14	Sn	0.0123	mass%	0.0012	0.0021	0.0062
15	Te	(0.0076)	mass%	0.0014	0.0032	0.0097
16	Ta	(0.0128)	mass%	0.0037	0.0105	0.0316

Spectrum

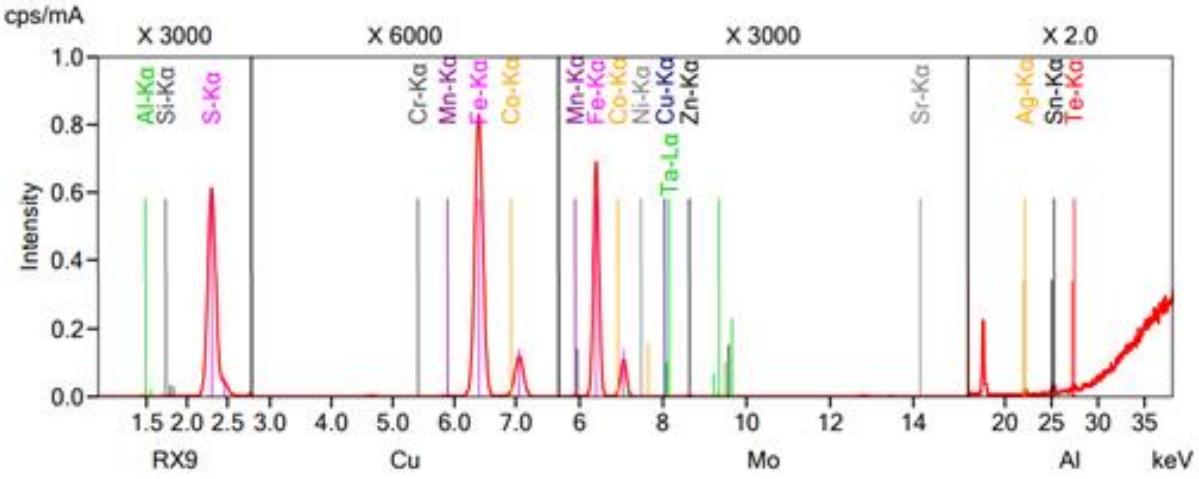


Figure 4 shows the results of the elemental composition of ferrous sulfate obtained in an X-ray luminescent spectrum analyzer.

Based on the experiments conducted, it can be said;

Uzbekistan has huge reserves of man-made waste containing iron and its compounds.

Demand for iron and its compounds is growing in our country.

If this technology is applied to industrial production, a significant part of these needs will be met.

The proposed technology does not require complexity and high cost.

The results of the analysis show that a high quality product can be obtained.

References:

1. Получение на основе железного купороса ферроферрioксидов как магнитных порошков
2. ЛС Ещенко, РА Воронцов, ИУ Рахманов - 2020
3. Получение сульфата калия на основе железного купороса
4. ИУ Рахманов - 2020
5. Исследование состава и свойств промежуточных и конечных продуктов в системе FeSO [4]–H [2] SO [4]–KOH–H [2] O
6. ИУ Рахманов, ВВ Климович, ДВ Гайдук - 2020
7. 4. ПОЛУЧЕНИЕ СУЛЬФАТА НАТРИЯ И ЖЕЛЕЗООКСИДНОГО ПИГМЕНТА НА ОСНОВЕ ЖЕЛЕЗНОГО КУПОРОСА.
8. Рахманов И.У. Шаматов С.А. www.oriens.uz -2021