GALAXY INTERNATIONAL INTERDISCIPLINARY RESEARCH JOURNAL (GIIRJ)
ISSN (E): 2347-6915
Vol. 12, Issue 5 May (2024)

EXTRACTION OF GOLD METAL FROM USELESS ELECTRICAL EQUIPMENT

Yakhayev Umar Abdukhakimovich
Big arrow Tashkent Institute of Chemical Technology
Umarya32@gmail.com

Mamatkulov Elyor Kambaralievich
Grand Hygiene Manufacturing LLC Texnology
elyormamatkulov30@gmail.com

Abdumajidova Madina Nematulla's daughter
Student
Madina12@gmail.com

Bozorov Ilyos Abduroxmonovich
Doctoral student Tashkent Institute of Chemical Technology
Ilyosbozorov182@gmail.com

ABSTRACT

To study the process of extracting the gold contained in the solution by passing the gold metal from the obsolete electrical equipment into the solution.

Acces.Currently, not only in Uzbekistan, but all over the world, there is a decrease in the base of ores and minerals for the extraction and production of non-ferrous, rare, scattered and rare metals, and the increase in the amount of waste, not only man-made secondary used useless electrical equipment, and as a result, the ecological balance 'change, it can be seen that it affects the climate changes as well. Taking these into account, man-made waste of production containing rare and rare metals, unusable electrical equipment, and waste processing are of particular importance. In this regard, it is of particular importance to determine the methods of processing mineral and secondary raw materials, to create technology for extracting non-ferrous and rare metals from the dust of metallurgical plants, and to develop resource-saving technology, as well as to improve and introduce existing technologies.

Keywords: Gold (Au), hornblende (3hcl*HNO_3), hydrazine (N_2H_4) lead (Pb), cementation chloric acid (hcl), nitric acid (HNO_3), muffle furnace, precipitation, melting, filtering.

INTRODUCTION

In the world, more than millions of tons of man-made waste from rare, scattered and rare metal enterprises have been accumulated, as a result of which nearby settlements, cultivated fields and the environment are seriously damaged. It should also be noted that gold (Au), silver (Ag), platinum (Pt), palladium (Pd), non-ferrous and rare, scattered metals are also used to perform various tasks in various types of useless electrical equipment. Extraction of precious metals from waste equipment is a cheaper technology than extraction from ore. It

is also cheaper and easier to extract from man-made waste. Grinding process, bringing and sometimes even enrichment is not necessary.

We know that gold (Au) and silver (Ag) metals are used in almost all types of electronics because they are good conductors and have many such possibilities. There are all kinds of schemes in technology that will one day break. We have to throw it away. We can observe this situation in all areas of our republic. Based on these, in order to choose the best method of extracting gold (Au) metal from the above, it was dedicated to choosing an easy, simple and cheap method by taking different methods.

Part of the experiment. For the purpose of experimenting, we started the work by first extracting the gold (Au) storage waste from the metal storage parts. We used two types of methods because the separated parts had to be cleaned of organic matter first. Dissolving with acetone or gasoline, the second method was burning at high temperature. Of these, incineration at 2000 ^{0}C was acceptable. The second main step was a 2-hour dissolution process in a nitrate solution.

Of course, the process was carried out with temperature. Nitrate can be obtained again by absorbing the gas released during the melting process.

The filtering process is carried out, and if we pay attention to the filtrate by washing it with water, we will see that there are undissolved metal parts, the reason is alloys that are insoluble in nitric acid. These alloys can be melted in a photolab with a high-temperature acid solution. If we dissolve in royal vodka, all undissolved metal alloys and gold will also dissolve.

However, the solution processing process becomes somewhat more complicated. It is possible to extract gold from a complex solution using electrolysis, or it can be precipitated using an organic substance, for example, using hydrazine.

It will be possible to deposit with zinc or iron metal. The precipitate precipitated with hydrazine is filtered off. The filtrate is dried using a dryer oven at 800 ^{0}C for 1 hour. For our semi-dried product, we pour lead into a mold and carry out this process in a muffle furnace. The semi-finished product is wrapped in a lead foil and loaded into a special mold and loaded into a muffle furnace at a temperature of 11000 ^{0}C. The gold metal remains in its pure state. Using this method, you can get 99.99 percent pure gold metal.

Depending on the difference in electric potential, other types of remaining metals dissolved in the original HNO_3 can be precipitated using electrolysis. In this case, it is possible to use an insoluble anode, that is, graphite or iron anode both in the anode and cathode. If there is mainly copper in the composition, it is possible to deposit it with cementation, that is, with iron. If the composition is complex, the precipitate is deposited with the help of iron, filtered and dried, and the anode is deposited from the anode to the cathode.

Photos taken during the experiment

In the process of transfer to the solution, the process of transferring the gold-bearing raw materials to the solution was also studied in two ways. In the first method, raw materials are first placed in nitric acid, and after a while, 3-proportion chloric acid was added to make the horn vodka. It turned out that this method is much more effective. But the process of precipitation of silver metal in its composition as a white precipitate led to the violation of the reaction. Therefore, it was determined that it is necessary to dissolve the component of man-made waste containing gold.

The results of the experiment were studied during the process using a fluorescent chemical analysis device. From the results of the study, the preliminary result was studied for transfer to the solution. The content of feltate after dissolution with nitric acid was studied. It was also analyzed for the extraction of other types of metals in the primary i.e. Nitric acid and the analysis of the last stage solution was also studied.

As a result of the experiment, it was found that the method of first dissolving the filtrate with nitric acid and then royal vodka, and then immersing it in hydrazine with the help of lead at a high temperature with a special blade is effective.

GALAXY INTERNATIONAL INTERDISCIPLINARY RESEARCH JOURNAL (GIIRJ)
ISSN (E): 2347-6915
Vol. 12, Issue 5 May (2024)

Analyzed result

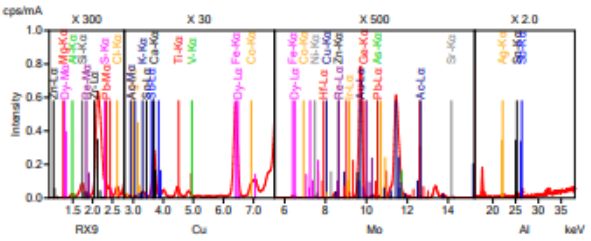
Sample Information

Sample name	Umar Au
File name	Umar Au
Application	Umumiy.
Date	2024/ 2/16 16:14
Analyzed by	
Counts	1
Comment	

Analyzed result(FP method, Scatter)

No.	Component	Result	Unit	Stat. Err.	LLD	LLQ
1	Cl	0.0652	mass%	0.0004	0.0004	0.0013
2	Mg	0.333	mass%	0.0106	0.0171	0.0514
3	Al	0.577	mass%	0.0064	0.0080	0.0241
4	Si	0.951	mass%	0.0040	0.0088	0.0263
5	S	0.377	mass%	0.0012	0.0011	0.0032
6	K	0.0530	mass%	0.0018	0.0023	0.0069
7	Ca	0.235	mass%	0.0026	0.0014	0.0041
8	Ti	0.0167	mass%	0.0005	0.0006	0.0019
9	V	0.0022	mass%	0.0002	0.0005	0.0016
10	Fe	0.0461	mass%	0.0005	0.0004	0.0013
11	Co	0.0047	mass%	0.0002	0.0004	0.0012
12	Ni	0.0147	mass%	0.0002	0.0002	0.0005
13	Cu	0.0021	mass%	0.0001	0.0003	0.0008
14	Zn	0.0024	mass%	0.0002	0.0005	0.0016
15	Ge	0.0079	mass%	0.0003	0.0010	0.0030
16	As	0.0041	mass%	<0.0001	0.0002	0.0007
17	Sr	0.0006	mass%	<0.0001	<0.0001	0.0002
18	Zr	0.0672	mass%	0.0007	0.0002	0.0006
19	Ag	0.0011	mass%	<0.0001	<0.0001	0.0003
20	Sn	0.0014	mass%	<0.0001	0.0001	0.0004
21	Sb	0.0026	mass%	0.0001	0.0002	0.0006
22	Hf	0.0023	mass%	0.0003	0.0007	0.0021
23	Re	0.0090	mass%	0.0005	0.0014	0.0041
24	Ir	0.0034	mass%	0.0002	0.0005	0.0014
25	Au	1.29	mass%	0.0017	0.0015	0.0045
26	Pb	0.0092	mass%	0.0001	0.0002	0.0005
27	Dy	(0.0014)	mass%	0.0004	0.0012	0.0036
28	Ac	0.0014	mass%	<0.0001	0.0003	0.0008

Spectrum



NEX CG Rigaku

Analyzed result

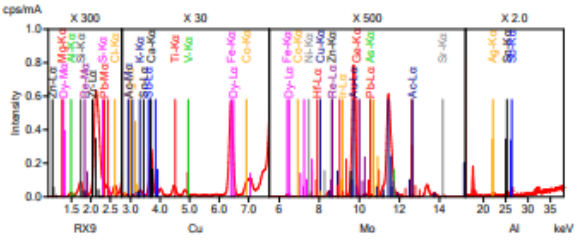
Sample Information

Sample name	Umar Au
File name	Umar Au
Application	Umumiy.
Date	2024/ 2/16 16:14
Analyzed by	
Counts	1
Comment	

Analyzed result(FP method, Scatter)

No.	Component	Result	Unit	Stat. Err.	LLD	LLQ
1	Cl	0.0652	mass%	0.0004	0.0004	0.0013
2	Mg	0.333	mass%	0.0106	0.0171	0.0514
3	Al	0.577	mass%	0.0064	0.0080	0.0241
4	Si	0.951	mass%	0.0040	0.0088	0.0263
5	S	0.377	mass%	0.0012	0.0011	0.0032
6	K	0.0530	mass%	0.0018	0.0023	0.0069
7	Ca	0.235	mass%	0.0026	0.0014	0.0041
8	Ti	0.0167	mass%	0.0005	0.0006	0.0019
9	V	0.0022	mass%	0.0002	0.0005	0.0016
10	Fe	0.0461	mass%	0.0005	0.0004	0.0013
11	Co	0.0047	mass%	0.0002	0.0004	0.0012
12	Ni	0.0147	mass%	0.0002	0.0002	0.0005
13	Cu	0.0021	mass%	0.0001	0.0003	0.0008
14	Zn	0.0024	mass%	0.0002	0.0005	0.0016
15	Ge	0.0079	mass%	0.0003	0.0010	0.0030
16	As	0.0041	mass%	<0.0001	0.0002	0.0007
17	Sr	0.0006	mass%	<0.0001	<0.0001	0.0002
18	Zr	0.0672	mass%	0.0007	0.0002	0.0006
19	Ag	0.0011	mass%	<0.0001	<0.0001	0.0003
20	Sn	0.0014	mass%	<0.0001	0.0001	0.0004
21	Sb	0.0026	mass%	0.0001	0.0002	0.0006
22	Hf	0.0023	mass%	0.0003	0.0007	0.0021
23	Re	0.0090	mass%	0.0005	0.0014	0.0041
24	Ir	0.0034	mass%	0.0002	0.0005	0.0014
25	Au	1.29	mass%	0.0017	0.0015	0.0045
26	Pb	0.0092	mass%	0.0001	0.0002	0.0005
27	Dy	(0.0014)	mass%	0.0004	0.0012	0.0036
28	Ac	0.0014	mass%	<0.0001	0.0003	0.0008

Spectrum



NEX CG Rigaku

Analyzed result

Sample Information

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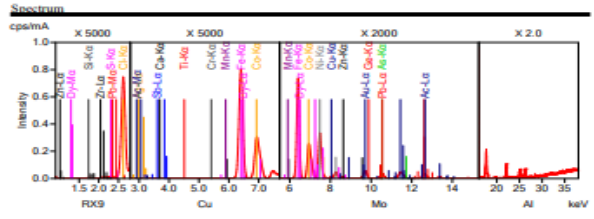
File name	X
Application	Umumiy.
Date	2023/12/16 09:36
Analyzed by	
Counts	1
Comment	

Analyzed result(FP method, Scatter)

No.	Component	Result	Unit	Stat. Err.	LLD	LLQ
1	Cl	0.0007	mass%		0.0002	0.0005
2	Si	0.0565	mass%		0.0005	0.0006 0.0017
3	S	0.0159	mass%		0.0003	0.0008 0.0023
4	Ca	0.0742	mass%		0.0007	0.0008 0.0023
5	Ti	0.0039	mass%		0.0002	0.0003 0.0010
6	Cr	0.0074	mass%		0.0001	<0.0001 0.0002
7	Mn	0.0078	mass%		0.0001	0.0002 0.0007
8	Fe	2.15	mass%		0.0004	0.0004 0.0011
9	Co	0.52	mass%		0.0002	0.0012 0.0036
10	Ni	1.00	mass%		0.0014	0.0006 0.0019
11	Cu	0.0242	mass%		0.0002	0.0003 0.0008
12	Zn	0.0207	mass%		0.0002	0.0001 0.0004
13	Ge	<0.0001	mass%			
14	As	0.0195	mass%		0.0002	0.0005 0.0014
15	Zr	0.0002	mass%			
16	Ag	<0.0001	mass%			
17	Sb	<0.0001	mass%			
18	Au	0.198	mass%		0.0006	0.0012 0.0037
19	Pb	0.0608	mass%		0.0003	0.0006 0.0018
20	Dy	(0.0230)	mass%		0.0027	0.0102 0.0305
21	Ac	0.0329	mass%		0.0003	0.0006 0.0017

Spectrum



NEX CG Rigaku

Analyzed result

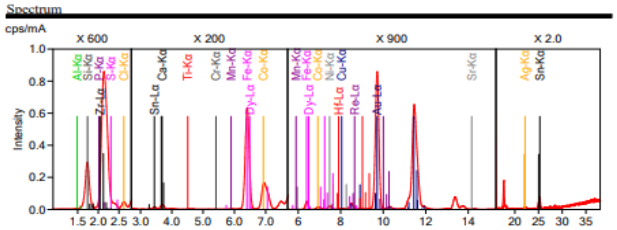
Sample Information

Sample name	U. Zolota
File name	U. Zolota
Application	Umumiy.
Date	2024/ 3/ 1 15:01
Analyzed by	
Counts	1
Comment	

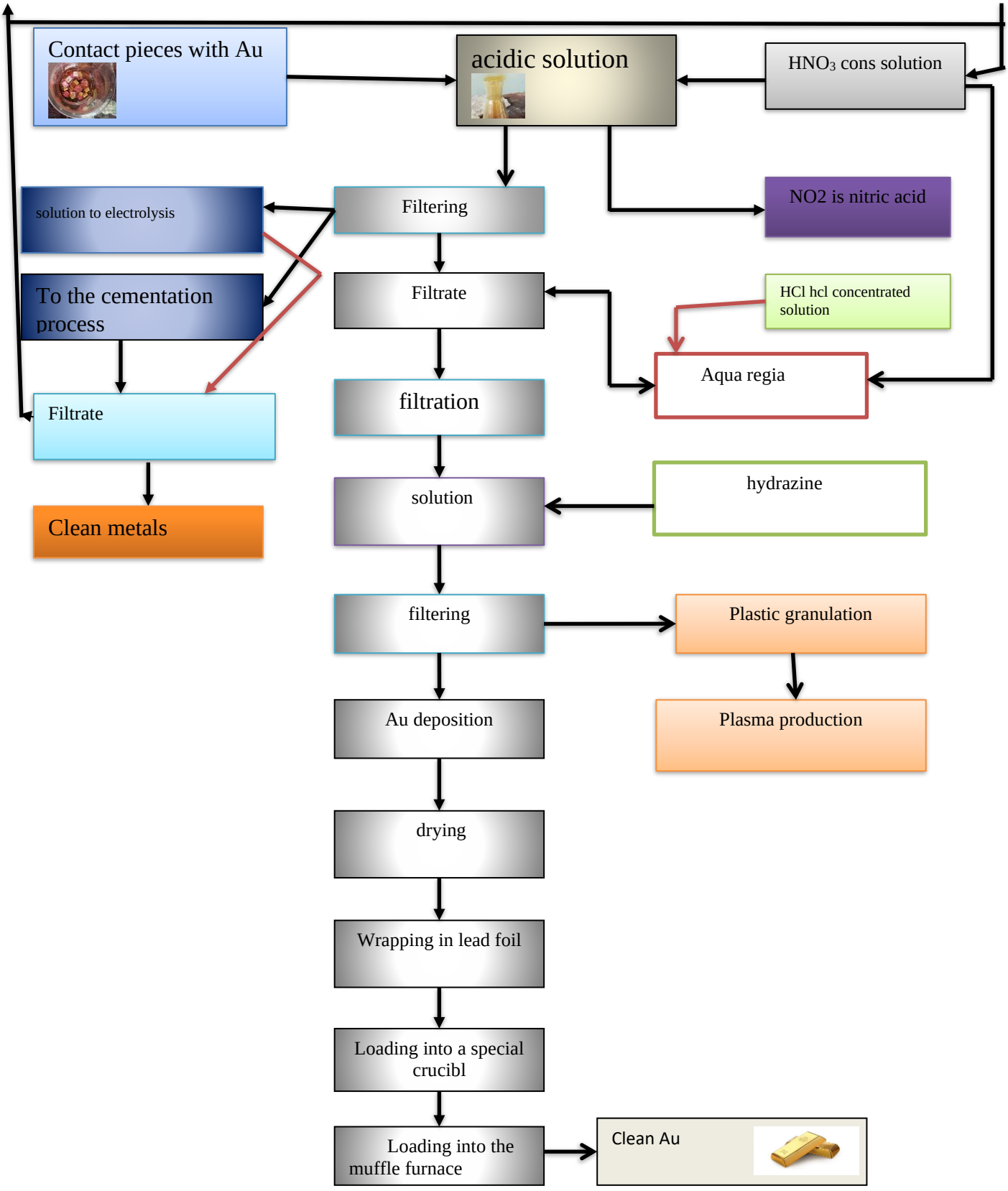
Analyzed result(FP method)

No.	Component	Result	Unit	Stat. Err.	LLD	LLQ
1	Cl	0.860	mass%	0.0038	0.0017	0.0051
2	Al	0.860	mass%	0.0130	0.0172	0.0515
3	Si	19.2	mass%	0.0317	0.0063	0.0190
4	P	0.942	mass%	0.0128	0.0214	0.0643
5	S	2.55	mass%	0.0100	0.0028	0.0083
6	Ca	1.93	mass%	0.0260	0.0203	0.0610
7	Ti	0.0283	mass%	0.0032	0.0076	0.0229
8	Cr	(0.0048)	mass%	0.0012	0.0032	0.0097
9	Mn	0.0582	mass%	0.0044	0.0092	0.0276
10	Fe	5.03	mass%	0.0237	0.0084	0.0251
11	Co	0.955	mass%	0.0100	0.0128	0.0384
12	Ni	1.12	mass%	0.0084	0.0051	0.0154
13	Cu	0.209	mass%	0.0037	0.0059	0.0178
14	Sr	0.0284	mass%	0.0015	0.0037	0.0111
15	Zr	3.00	mass%	0.0339	0.0087	0.0260
16	Ag	0.0161	mass%	0.0032	0.0047	0.0141
17	Sn	0.202	mass%	0.0083	0.0066	0.0198
18	Hf	(0.0503)	mass%	0.0076	0.0226	0.0677
19	Re	0.436	mass%	0.0127	0.0325	0.0974
20	Au	62.4	mass%	0.128	0.0075	0.0226
21	Dy	(0.124)	mass%	0.0241	0.0661	0.198

Spectrum



A technological scheme was created to extract gold metal from obsolete electrical Equipment.



SUMMARY

In conclusion, it should be said that the extraction of pure gold from useless electrical equipment, as well as the extraction of other metals, is an important process. Therefore, manual sorting was chosen as the initial processing step. The next process is to open the surface, i.e. To clean it from organic matter by incineration, it was found to be cheap. This is because it has been observed that cleaning with acetone, gasoline or similar substances may increase the cost. Initially, it was considered appropriate to use nitric acid for the solution. As we all know, gold does not dissolve in nitric acid, and the rest of the metals, that is, the metals in our raw materials, dissolve. We preferred to use royal vodka to melt the next main gold. The substance hydrazine was chosen to separate the gold from the solution. We have found that it is possible to obtain cheap and clean gold from the deposit by melting and cementing the lead and lead in a muffle furnace.

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