

REVIEW OF PRICE FOR REFINEMENT GOLD FROM GOLD CONTACT SCRAP OF ELECTRONIC COMPUTERS

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ABSTRACT

The paper gives the methods of gold recovery from the contact scrap of electronic computers from large systems. Also, the methods purification are given and they separate gold from the impurities (tin, copper, and nickel) contained in the solution in higher percentaga than gold. Also, the optimum quantitiens of spent reagents for gold extraction are presented.

The obtained gold powder is of quality 99,9%.

The aim of the paper was to extract pure gold from gold plated computer contacts discarded from the system as obsolete ones. Institute of mining and metallurgy Bor is equipped with accessories for gold recovery and is able to render services to others. [3]

Key words: gold recovery, contact scrap, gold powder 99,9%,.

1. INTRODUCTION

Institute of mining and metallurgy Bor has renovated the computer center and obsolete computers have been discarded from the sistem. Since the contacts in computers are gold plated, the possibility of gold recovery from those contacts started to be investigated.

The optimum quantities of raw materials for gold recovery and the cost of raw materials and labour have been defined, and it turned outthat gold recovery from electronic scrap is very profitable. [4]

2. EXPERIMENTAL PART

Various gold plated parts of old computers have been processed:

- plates of cental processors and peripheral machines
- electonic plates(gold plated)
- sockets for plates
- cable heads

Gold recovery has been performed by gold reduction from the solution by means of same reduction agent (sodium-sulphate, sodium – nitrate, sulphur- dioxide, etc.) [2]

2.1. Recovery of gold powder

Gold recovery from electronic scrap is performed in four stages:

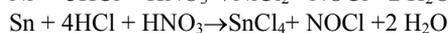
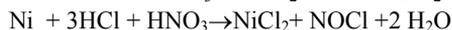
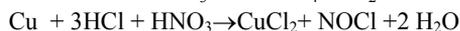
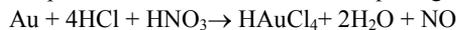
1. Preparation of gold plated parts for dissolution.

Preparation was done by mechanical processing, i.e. by rejecting the parts without gold, for the purpose of less acids consumption required for dissolution.

2. Metal dissolution (gold, tin, cooper and nickel) from gold plated parts.

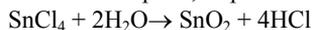
The prepared parts were dissolved in aqua regia where all quantities of oll present metals entered the solution in the form of chlorides, while all other non-metal parts remained undissolved.

The present metals are dissolved in aqua regia according to the following reactions:



3. Solution purification from tin

In the course of (tin II) – chloride hydrolysis, β -tin acid is formed and separated in the form of voluminous deposit, as per the following reaction:



4. Gold reduction

Selective gold reduction has been performed so that a part of dissolved tin and all the quantity of copper and nickel remain in the solution in the form of chlorides.

Gold reduction is done as follows:



The reduced gold in the form of powder is separated by filtering, washed, dried and measured.

The recovered gold powder had the quality of 99, 99%. [2]

2.2. Expriment working conditions

Disolution of gold and associated metals in aqua regia was preformed without additional heating. Namely, reactions of metals dissolution in aqua regia are exothermal ones, so that the temperature was about 80°C after the completion of dissolution.

Gold reduction was done from the solution which contained 5-10gAu/l and pH=1, 2-2. [2]

3. RESULTAT AND DISCUSSION

In dependence on the type of gold –plated parts which were used for gold recovery, different quantities of raw materials were spent. So, for gold recovery from the central processor plates and peripheral machines, the raw material consuption was the least one, compared to the highest consumption achieved in gold recovery from cable heads.

Table 1 shows the consumptions of rows materials and electrical power according to the type of the elekctronic scrap which is processed.

Table 1. Reagents of row materials and elekctrical power for gold regeneration depending on the tipe of electronic scrap

Ser. nuber	Row material	Plates of central processor and peripheral machines	Electronic plates (gold plated)	Socketed for plates	Cable heads
1.	Nitric acid (dm ³)	0,014	0,020	0,030	0,036
2.	Hydrochloric acid (dm ³)	0,042	0,060	0,090	0,100
3.	Reducing agent (kg)	0,0015	0,0018	0,0018	0,002
4.	Distilate water (dm ³)	1	1,2	1,2	1,5

Table 2 gives the cost of raw materials and electrical power for 1g gold recovery with the shown minimum and maximum quantities of raw materials and electrical power consumed in dependence on the type of gold- plated parts.

Table .2. Price for regeneration 1 g of gold

Ser. number	Row material	€/ dm ³ ,kg,kWh	Min.-max.	Σ Min.-max.
1.	Nitric acid	0,608	0,014-0,036	0,008-0,022
2.	Hydrochloric acid	0,326	0,042-0,1	0,014-0,033
3.	Reducing agent	1,087	0,0015-0,002	0,0016-0,0022
4.	Distilated water	0,065	1,0-1,5	0,065-0,098
5.	Electrical power	0,029	1,0-1,1	0,029-0,032

Σ Row material = 0,1176-0,1872 €/ 1 g

Price of manpower/ 1 g of gold: 0,1 €.

Totally price of refinment (row material + price of manpower) / 1 g gold: 0, 2176-0, 2872

Selling price of gold: 21 €/ 1 g

Profit: 20,782-20, 7128 €/ 1 g

This accaunt have made in june 2009. [3]

4. CONCLUSION

1. Quality of the obtained powder gold by means of recovery from electronic scrap is 99, 9% Au.
2. According to the difference in commercial price and gold processing cost, it can be concluded that gold recovery from electronic crap is very profitable. [3]

5. REFERENCES

- [1] W.S.Rapson and T.Groenwald, Gold usage, Academic Press, London-New York-San Francisko, 1978., 196-270
- [2] E. S. Gould, Inorganik reaction and struktures, Menlo Pork, California, February 1962
- [3] Tanaka, Noble Metal Industrial, Co. Ltd, Jpn. Kokai Tokkyo JP 58, 1983
- [4] E.M. Wise, Gold recovery, properites and application, New Jersey 1962

