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SHARING OF RHODIUM IN PRODUCTS OF ANODE SLIME REFINEMENT

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ABSTRACT
The research with the aim of obtaining rhodium of commercial quality in the precious metals production work unit is focused on two objectives:
1) where the first is learning about the behaviour and sharing of rhodium in the existent process of anode slime refinement and
2) improving methods for its obtaining.
The research is directed towards monitoring the rhodium content and its sharing from dore metals to final products in the precious metals production work unit. The analysis of the rhodium content and its sharing has included all phases in anode slime refinement , as well as waste solutions which are obtained in the refinement process.
Key words: rhodium, sharing, anode slime

1. INTRODUCTION

To be able to see where and in which products and in what quantities rhodium concentrates, to ascertain the products which can be used as a starting material for its obtaining and to make sure that its refinement is technically and economically justified we have dome some research to learn more about rhodium behaviour and its sharing in the existent process of anode slime refinement.
Rhodium behaviour and its sharing towards products of anode slime refinement is based on physicochemical characteristics of pure elements and their compounds which appear in the process. Regarding the fact that the conditions of technological process vary a great deal in industrial proportions, we have monitored this process over the period of eight months in order to gain the true knowledge of how this metal behaves and shares.

2. EXPERIMENTAL RESEARCH AND DISCUSSION OF THE RESULTS

After electlolitical refinement of copper there is an amount of copper anode slime which falls on the bottom of electrolitical cell, it gathers in the slime reservoir, it is treated there and it is sent to the precious metals production work unit.
From January to August 2008. we analysed rhodium sharing in the material of all phases of anode slime refinement in the precious metals production work unit.

Monitoring rhodium content starts in the first phase of anode slime refinment i.e. in the phase where the copper anode slime is turned into non-copper anode slime and the process ends with the final products in the precious metals production work unit.

We have analysed only every tenth copper slime and the content of rhodium in copper anode slime is shown in Table 1. Having in mind the fact that we have not measured the weights of copper anode slime during the analysis of rhodium sharing, only the rhodium contents in every tenth slime are shown in table 1.

Table 1. Rhodium content in copper anode slime (NAM)

No.	Copper anode slime	Content Rh, %
1	R10	0,0003
2	R20	0,0006
3	R30	0,0004
4	R40	0,0003

Rhodium content has been analysed in the starting and waste electrolite and in the water after the process of anode slime R10 washing. The presence of rhodium has been identified both in the electrolite and the water with the amount of < 0,0001 g/dm^3.

In order to monitor material balance in the first phase of anode slime refinement, we have monitored the rhodium content in copper dry slide from R7 to R40.

Non-copper slides, their weights and rhodium content in dry copper slide are shown in Table 2.

Table 2. Rhodium content in non-copper anode slime (OAM)

No.	Non-copper anode slime	Content Rh, %	Amount of dry OAM, kg	Amount of Rh, g
1	R7	< 0,0001	501,36	0,50
2	R8	< 0,0001	501,36	0,50
3	R9	< 0,0001	501,36	0,50
4	R10	0,0003	501,36	0,50
5	R11	0,0003	501,36	1,50
6	R12	0,0004	501,36	2,00
7	R13	0,0003	579,12	1,74
8	R14	0,0003	469,17	1,41
9	R15	0,0005	522,07	2,61
10	R20	0,0006	797,53	4,78
11	R30	0,0007	595,90	4,17
12	R40	0,0005	530,60	2,65
Total amount of Rh in dry OAM, g				22,86

The rhodium contents in copper anode slime (NAM) and non-copper anode slime (OAM) in slides R10 and R20 are exactly the same, which leads to the conclusion that during the process of removing copper, rhodium does not appear either in waste electrolite or the water which was used in the process of non-copper anode slime washing. It stays in the non-copper anode slime.

After the process of removing copper and obtaining non-copper anode slime, there comes the second phase of anode slime refinement, which is the phase of removing selenium i.e. the roasting phase by sulphate acid, which products are non-selenium anode slime i.e. roasted material and selenium as a by-product.

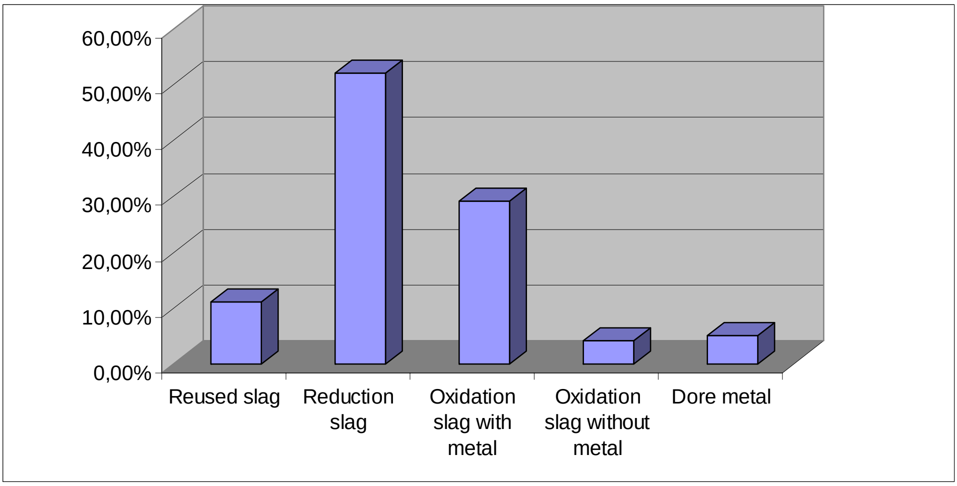
The rhodium content has been analysed in the compound roasted material in three charges, the same ones in the melting process T1/2008.

Rhodium content in the compound roasted material in the melting process T1/2008 is shown in Table 3.

Table 3. Rhodium content in non-selenium anode slime for T1

No.	Charge of roasted material	Content Rh, %	Amount of roasted material, kg	Amount of Rh in roasted material, g
1	T1/1	0,0004	2400	9,60
2	T1/2	0,0006	3000	18,00
3	T1/3	0,0006	2252	13,50
Total			7652	41,10

Rhodium sharing in percentage in the melting process towards Dore metal is shown in the Picture 1.



Picture 1. Rhodium sharing by melting process

4. CONCLUSIONS

In compliance with our expectations, the total amount of rhodium from copper anode slime appears in the non-copper anode slime in the process of copper removal.

In the melting phase, the highest concentration appears in the reduction slag and is 51,53 % Rh. Among the other melting products and regarding the rhodium content, the oxidation slag with the metal takes the second place and for the melting process T1 is 29,20 % Rh.
Unsuspectingly, a very low concentration of rhodium, only 4,86% Rh, has been noted in Dore metal for the melting process T1. The total amount of rhodium in dusts in Dore furnace in the melting process ranges from 0,21 % to 1,03 % Rh.

The analysis of rhodium sharing in the phases of anode slime refinement points to the fact that, for now, the oxidation slag with metal is the most appropriate material for rhodium obtaining. The possibility of rhodium obtaining from this raw material should be experimentally verified. We must also look carefully into techical and economic justification of its refinement.

5. REFERENCES

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