Recovery copper and tin from a complex Oxide Copper Ore

Chuanfa Cui [1,2,a], Shuming Wen[1,2,b*] , Yawei Liu [3,c]andYijie Wang [1,2,d]

[1] State Key Laboratory of Complex Nonferrous Metal Resources Clean Utilization, Kunming University of Science and Technology, Kunming 650093, China

[2] Faculty of Land Resource Engineering, Kunming University of Science and Technology, Kunming 650093, China

[3] Yunnan Hualian Zn-In Shares Co., Ltd Wenshan 663000, China

[a]ccf99999@126.com, [b]shmwen@126.com(Corresponding Author),

[c]907947582 @qq.com, [d]yjwang2012@126.com

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Abstract. The test study, the use of re-election - flotation processes can be efficiently recover copper, tin, sulfur, comprehensive utilization of resources to achieve the purpose. From ore analysis, the mine oxidation rate, up 43.46%, is a copper oxide; active copper is high, reaching 20.03%; other metals iron, lead and zinc content is high, is relatively refractory ore. Due to high rate of oxidation, serious mud after grinding, and ore contains a large number of mica, mica mineral mud and entrained in the foam, coupled with active copper, high impurity content, especially in the lead is the coexistence of a variety of lead mineral is difficult to suppress copper concentrate quality is difficult to improve.

Introduction

In natural resources, it is an important metal tin, silver and white, shiny, chemical stability, corrosion resistance, low toxicity, good ductility. Many important properties of tin malleability, ductility and corrosion resistance, etc. so that tin has a variety of uses. Currently, the tin more applications in the chemical, metal fabrication, decoration, etc. [2]. Tin of applications covering almost strategic emerging industries, therefore, tin is an important mineral resource development of strategic emerging industries, particularly those with significant strategic value in military, aviation, atomic energy field, tin. Tin choose other main method is to re-election and flotation. In reselection size has an important effect on the sorting effect, for coarse-grained disseminated ore sorting good effect, and for fine grade ore sorting difficulty increases [2]. The test study, the use of re-election - flotation processes can be efficiently recover copper, tin, sulfur, comprehensive utilization of resources to achieve the purpose. The purpose of this study was to test the availability of qualified copper concentrate at the same time, as much as possible the recovery of tin minerals to achieve efficient utilization of mineral resources.

Materials

After grinding ore -0.074mm 60% of copper, tin and copper mine dissociation situation, coarse grain size tin. + 0.2mm Grade: chalcopyrite-based monomer, but less, the amount of sulfur and copper combination of micro, small amount of oxygen-copper combination; seen cassiterite monomer. 0.2-0.074mm level: chalcopyrite-based monomer, but less, veins of copper, sulfur and copper combination of micro amount of oxygen copper has monomer dissociation, less; cassiterite most have monomer dissociation, pulse tin, iron, tin and tin phases combined copper objects less of ore phase analysis results are shown in table 2 and Table 3.

Table 1 The Mult-elements analysis material

Components	Cu	Sn	S	Fe	As	Zn
Wt (%)	0.619	.0654	7.32	34.27	0.559	0.996
Components	Pb	Wo	K	P	Ca	Mg
Wt (%)	0.893	0.042	0.71	0.092	16.80	7.20

From Table 1, it is a more typical complex polymetallic ores, valuable elements which are mainly tin, copper, lead, zinc, iron and sulfur.

Table 2 Copper phase analysis of material

Projiect	Free copper oxide	Conjunction oxidized copper	Secondary copper sulphide	Primary copper sulfide	Total copper
Content(%)	0.13	0.12	0.13	0.22	0.61
Occupancy(%)	21.81	20.03	21.65	36.51	100

As can be seen from Table 2, copper ore oxidation rate was higher, accounting for 43.46%. It increases the difficulty of the flotation recovery of copper minerals in the ore.

Table 3 Tin phase ananlysis of material

Projiect	Acid molten tin	cassite rite	Total tin
Content(%)	0.06	0.59	0.65
Occupancy(%)	9.48	90.52	100.00

As can be seen from Table 3, the vast majority of tin ore cassiterite, and its distribution was 90.52%, followed by acid-soluble tin tin, distribution rate of 9.48%. Thus, the recovery of tin ore minerals, should give priority to the re-election.

Results and discussion

According to the nature of the sample analysis, test focuses on the recovery of tin and copper minerals. In order to reduce the impact of the oxide and sulfide mineral collecting tin for re-election. Test program for the flotation of useful minerals tentatively re-sorting of copper sulfide, re-election process for the recovery of tin float heavy joint process. The grinding fineness is separated from copper and tin copper tin achieve key, the grinding fineness is determined both to give full consideration tin, copper minerals monomer dissociation, but also to minimize over crushed tin, tin reduce losses and facilitate re-election effective recovery equipment. Removal of sulfur compounds selected from tin impurities is crucial. Since this type of ore containing a large amount of sulfide and its large density, single-use re-election can not be removed, so we must re-election before the flotation desulfurization, in order to obtain good quality tin concentrates and tin higher recoveries.

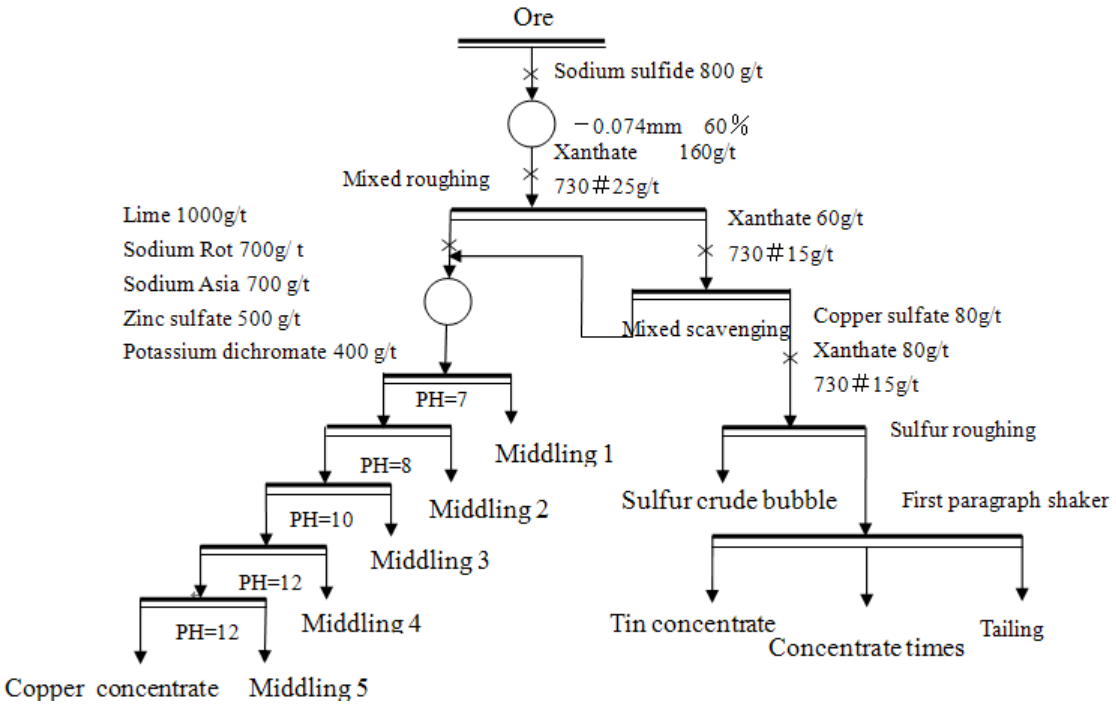

Fig 1

The results of the first group（Some wear not add sodium sulfide）

Products	Yield%	Cu		Sn		S	
		Grade%	Recovery%	Grade%	Recovery%	Grade%	Recovery%
Copper concentrate	3.32	**2.532**	**14.96**	0.114	0.53	53.96	22.31
Middling 5	2.88	2.317	11.92	0.116	0.47	50.06	18.36
Middling 4	1.61	1.886	5.39	0.128	0.29	39.91	8.13
Middling 3	1.61	0.916	2.62	0.177	0.40	15.91	3.24
Middling 2	3.48	0.669	4.14	0.219	1.06	9.85	4.35
Middling 1	15.51	0.617	17.05	0.286	6.17	13.00	25.61
Sulfur crude bubble	2.68	0.571	2.72	0.270	1.00	5.31	1.80
Some tin concentrates	1.02	0.198	0.36	**29.20**	**41.29**	2.364	0.31
Concentrate period of time	17.97	0.331	10.60	1.207	30.19	3.29	7.51
Paragraph tailings	49.92	0.340	30.24	0.268	18.60	1.322	8.38
Total	100	0.561	100	0.719	100	7.88	100

The results of the second group

Products	Yield%	Cu		Sn		S	
		Grade%	Recovery%	Grade%	Recovery%	Grade%	Recovery%
concentrates	6.03	**3.84**	**34.93**	0.097	0.84	51.70	38.86
Middling $_5$	1.32	2.295	4.58	0.091	0.17	44.16	7.28
Middling $_4$	0.92	1.745	2.42	0.116	0.15	34.00	3.90
Middling $_3$	1.11	1.022	1.71	0.184	0.29	17.61	2.44
Middling $_2$	3.82	0.780	4.49	0.184	1.01	12.74	6.07
Middling $_1$	13.34	0.511	10.28	0.320	6.12	11.64	19.34
Sulfur crude bubble	3.18	0.726	3.48	0.287	1.31	9.47	3.75
Some tin concentrates	2.22	0.276	0.92	**19.49**	**62.14**	5.33	1.48
Concentrate period of time	16.60	0.364	9.11	0.502	11.95	3.32	6.87
Paragraph tailings	51.46	0.362	28.08	0.217	16.02	1.564	10.01
Total	100	0.663	100	0.697	100	8.03	100

The experimental flow sheet was shown in fig 2

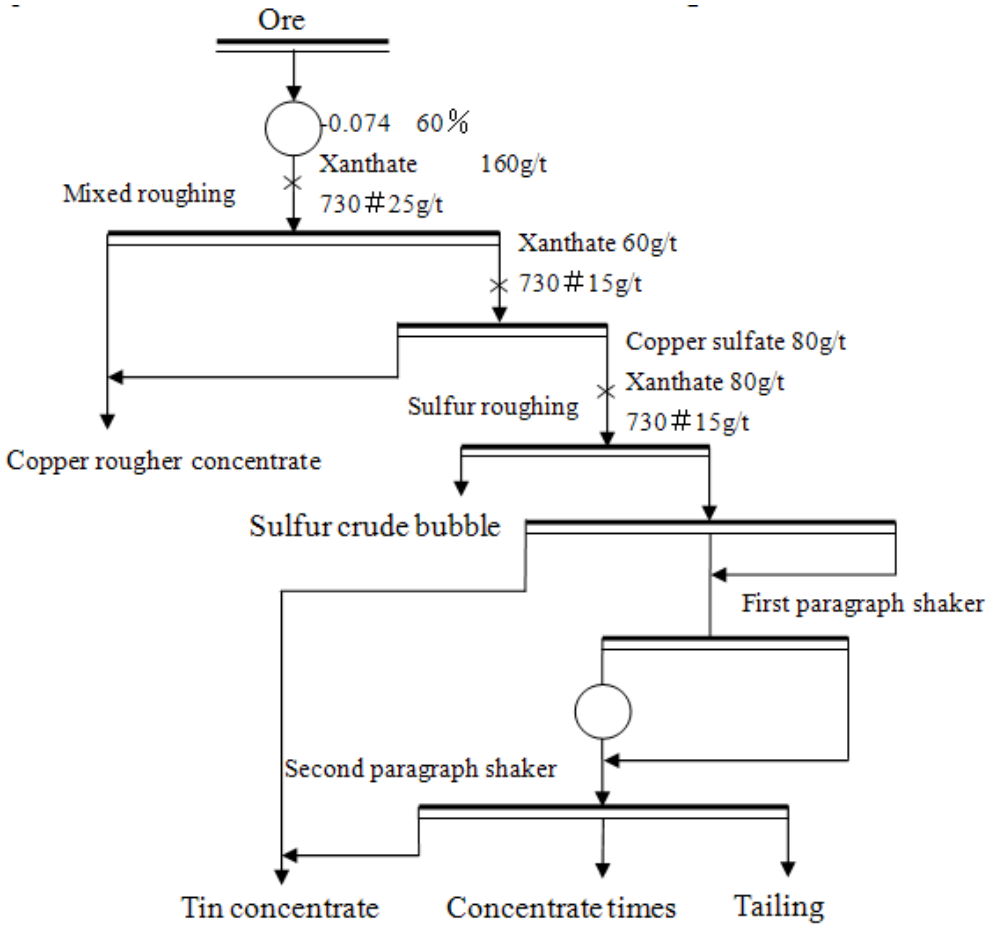

Fig 2

The results of the second group

Products	Yield%	Cu		Sn		S	
		Grade%	Recovery%	Grade%	Recovery%	Grade%	Recovery%
Copper rougher concentrate	23.83	1.426	56.14	0.196	6.20	26.03	82.39
Sulfur crude bubble	4.13	0.555	3.79	0.310	1.70	4.48	2.46
Tin concentrate	3.09	0.280	1.43	**17.90**	**73.37**	6.50	2.67
Concentrate times	23.78	0.317	12.45	0.235	7.41	1.892	5.98
Tailings	45.17	0.351	26.19	0.189	11.32	1.083	6.50
Total	100	0.605	100	0.754	100	7.53	100

Conclusions

(1) From ore analysis, the mine oxidation rate, up 43.46%, is a copper oxide; active copper is high, reaching 20.03%; other metals iron, lead and zinc content is high, is relatively refractory ore.

(2) Due to high rate of oxidation, serious mud after grinding, and ore contains a large number of mica, mica mineral mud and entrained in the foam, coupled with active copper, high impurity content, especially in the lead is the coexistence of a variety of lead mineral is difficult to suppress copper concentrate quality is difficult to improve. Such as by current production process and reagent system, it is difficult copper concentrate output of qualified products.

(3) For tin, after flotation selected impurity into the shaker tin, you can get a better indicators of crude tin concentrates.

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