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Research Article

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Research on mineral processing of copper supplied ore in Yunnan province

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ABSTRACT

Take a copper ore in Yunnan province as the object. Based on the analysis of the properties and copper phase, recovering copper concentrate from copper ore by flotation was determined. The effects of grinding fineness, collector dosage and inhibitor dosage were researched. The copper concentrate was obtained by adopting flotation process of one roughing three times concentrate and three times scavenging with the grade 20.45% and the recovery rate 86.73%. It laid a solid foundation for the further development of this copper ore.

Keywords: copper supplied ore, mineral processing, flotation, copper concentrate.

INTRODUCTION

Copper is an important metal material and widely applied in many areas with an irreplaceable role in other materials. Due to the continuous exploitation of mineral resources, the ore is more difficult to process with ore increasingly poor, fine and miscellaneous. China is lack of copper resources and copper concentrate production can only meet 40% of domestic demand. There is a low-grade cooper ore in Yunnan province. For taking use of this copper ore, flotation was researched on recycling copper concentrate from this ore. The effects of grinding fineness, collector dosage and inhibitor dosage were researched. I hope that this paper will be helpful to take use of low-grade copper ore [1-6].

Ore Property

This copper ore are the experimental materials, first of all, the component analysis of the copper ore was researched and the result is shown in table 1.

Table 1 the component analysis of the copper ore (%, mass fraction)

element	Cu	S	SiO_2	Fe	MgO	Al_2O_3	P	WO_3	As
content	0.68	4.45	35.77	19.53	2.56	6.24	0.64	0.05	0.029

From table 1 Cu, Fe, SiO_2, Al_2O_3 and S are the main ingredients of this copper ore. The content of copper is 0.68% and the content of silica is 35.77%. Copper is the main useful metals and silica is the main gangue. This ore is single copper ore. For defining the existing form of copper, the analysis of copper phase was researched and the result is shown in table 2.

From table 2, the main copper existing form of copper is copper sulfide. We can recovery copper concentrate by flotation.

Table 2 the phase analysis of the copper ore

type	Copper sulfide	Free Cu oxide	Combined Cu oxide	total
Content/%	1.98	0.03	0.02	2.03
Share/%	97.54	1.47	0.99	100

Flotation Separations

Flotation flow sheet is shown in chart 1

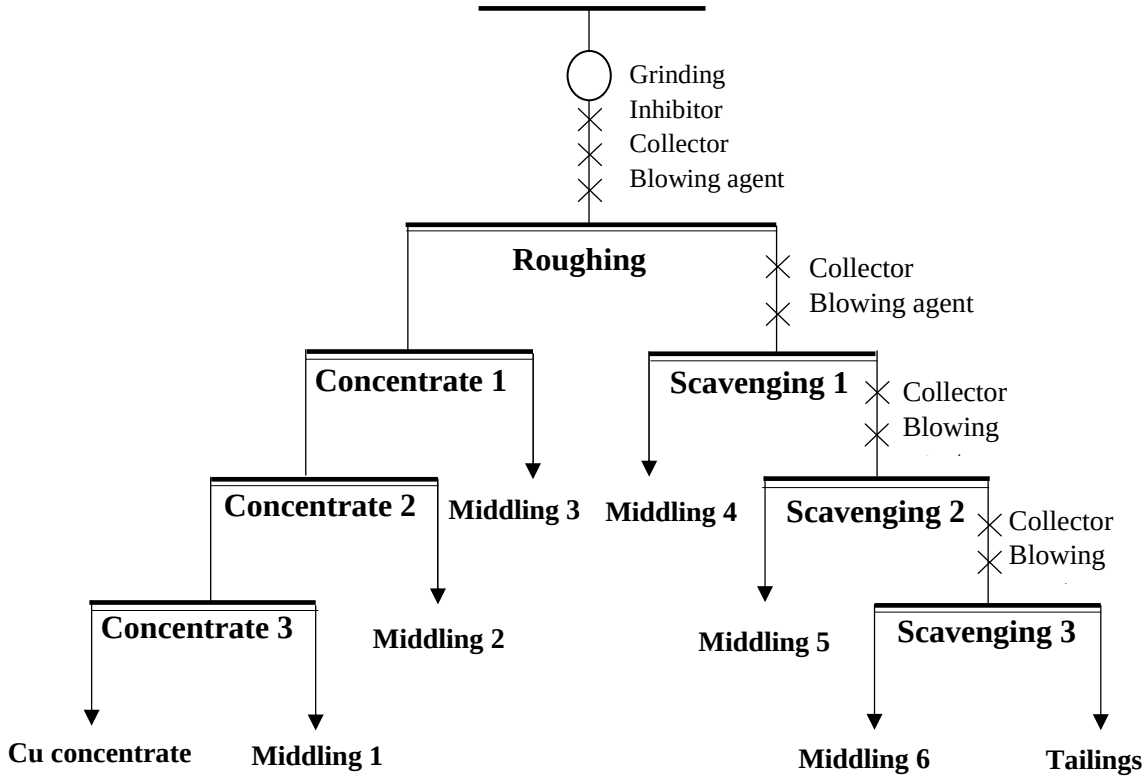

Chart 1 flotation flow sheet

Grinding fineness is the 0.074mm content, lime is the inhibitor, xanthate is the collector and pine oil is the blowing agent.

Experiment

Grinding fineness, collector dosage and inhibitor dosage are the main effects of recovering copper concentrate from the copper ore. Grinding fineness, collector dosage and inhibitor dosage are researched in the process of recovering copper concentrate.

Grinding fineness. Lime is 4000g/t, xanthate is 100g/t and pine oil is 20g/t. For examining the different grinding fineness effect of flotation, a grinding fineness test was conducted and the results are shown in table 3.1.

From table3.1, grinding fineness has little effect on the grade of copper and great effect on the recovery of copper concentrate. Considering the grade and recovery of the copper concentrate, the optimal grinding fineness is 80%.

Lime dosage. Grinding fineness is 80%, xanthate is 100g/t and pine oil is 20g/t. Lime can inhibit pyrite in the process of flotation .The effect of lime dosage was researched and the result is shown in table 3.2.

Table3.1 results of grinding fineness

Grinding fineness	name	yield/g	Cu grade /%	Cu recovery /%
-0.074um70%	Cu concentration	2.86	18.34	86.26
-0.074um75%	Cu concentration	2.79	19.14	85.99
-0.074um80%	Cu concentration	2.74	20.34	85.66
-0.074um85%	Cu concentration	2.53	20.98	83.44
-0.074um90%	Cu concentration	2.33	21.45	77.45

Table3.3 the results of inhibitor (lime) dosage

Lime dosage	name	yield/%	Cu grade/%	Cu recovery/%
1000g/t	Cu concentration	4.56	10.34	89.78
2000g/t	Cu concentration	3.43	15.45	87.56
3000g/t	Cu concentration	2.54	20.43	87.31
4000g/t	Cu concentration	2.51	20.89	84.31
5000g/t	Cu concentration	2.52	21.13	81.35
6000g/t	Cu concentration	2.49	21.34	79.92

Lime is the inhibitor of pyrite in the process of flotation. With the increase of lime dosage, the grade of copper concentrate is increased and the recovery of copper concentrate is reduced. Considering the grade and recovery of the copper concentrate, the optimal lime dosage is 3000g/t.

Collector dosage. Grinding fineness is 80%, lime dosage is 3000g/t and pine oil is 20g/t. Xanthate is the collector .The effect of collector dosage was researched and the result is shown in table 3.3.

With the increase of collector dosage, the grade of copper concentrate is reduced and the recovery of copper concentrate is increased. Considering the grade and recovery of the copper concentrate, the optimal collector dosage is 100g/t.

Table3.3 the results of collector (lime) dosage

xanthate	name	yield/%	S grade/%	S recovery/%
50g/t	C concentration	1.76	23.58	75.43
100g/t	C concentration	2.54	20.45	86.73
150g/t	C concentration	3.04	16.56	89.21
200g/t	C concentration	4.45	10.38	91.49

CONCLUSION

Grinding fineness, collector dosage and inhibitor dosage were researched in the process of recovering copper concentrate from copper ore. At the condition of grinding fineness 80%, lime dosage 3000g/t , xanthate 100g/t and pine oil 20g/t, the grade of copper concentrate is 20.45% and the recovery rate is 86.73%. This low-grade copper can be uses by flotation.

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