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Research Article

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Research flotation process on goldmine in Agu Village Yongping County, Yunnan Province

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ABSTRACT

Based on the analysis of Multi-element and phase, flotation was used to enrich gold from goldmine. The effect of grinding fineness, inhibitors, activators and collectors were researched on enriching gold from goldmine by flotation. At the condition of grinding fineness -0.074mm85%, the dosage of Na2CO3 800g/t, water glass 600g/t, Cu2SO4 60g/t, butyl xanthate 400+100g/t, pine oil 60+30g/t, a fine quality gold concentrate was obtained with the grade of 31.01g/t, comprehensive gold recovery of 87.36%.

Keywords: goldmine, flotation, process.

INTRODUCTION

In recent years, the demand of Chinese economy for mineral resources continue to increase with its rapid development, gold's requirement will be increased as a national strategic reserve resources. As the shallow deposits, high-grade gold resources continue to be exploited, easy to mining and smelting of gold resources become less and less, forcing the need to study of low-grade refractory gold[1].

A low-grade, high arsenic goldmine in Agu village Yongping County, Yunnan Province, it belongs to the quartz vein type goldmine, gold content of 0.93g/t around, and arsenic content of 1.36%, partially arsenic minerals oxidized. Gold minerals was disseminated occur in pyrite, arsenopyrite and quartz, small in oxidized arsenic minerals, these two parts of mineral refractory led to gold mineral recovery unsatisfactory. And its dissemination size uneven thickness, fine grade gold accounted for most part, this requires fine grinding of ore needed to determine the appropriate grinding fineness. Gold ore containing part of the copper minerals, it has a high recovery value, exist in the form of copper oxide mainly. Initially considered, using flotation to recovery gold minerals, copper minerals into the tailings, it does not make the recovery of copper minerals in this study.

Ore properties

Multi-element analysis results of ore are shown in table1.1, and phase analysis results of gold in table1.2.

Table 1.1 Multi-element analysis of ore %

element	Pb	As	Cu	S	Fe
content	0.022	1.36	2.21	0.38	7.54
element	Al_2O_3	MgO	CaO	Au	SiO_2
content	10.50	0.87	1.23	0.93	35.78

Note: the gold unit is g/t

The main ore mineral are pyrite, arsenopyrite, hrysocolla, covellite, chalcopyrite, hematite and limonite, etc; gangues mainly include quartz, also contains part of chlorite, illite, sericite, clay minerals. The main valuable element is gold for mineral recovery, its content of 2.10g / t, comprehensive recycling target is copper which is about 2% grade, and the main ingredient is SiO_2 need to exclude, followed by Al_2O_3, both the total content of 46.28%.

Table1.2 Phase analysis of gold

mineral type	wrapped by pyrite	wrapped by arsenopyrite rsenopyrite	other	total gold
content/%	0.68	0.12	0.13	0.93
percentage /%	73.25	12.31	14.44	100.00

Most of the gold is wrapped by pyrite, which content of 73.25%, secondly by arsenopyrite, their total content of 85.56%. Due to the same mineral formation conditions, mineral composition and structure, and the very similar flotability of pyrite and arsenopyrite, the mineral separation is difficult, it is a major problem in mineral processing works [2]. Flotation enrich gold minerals preliminary, it can be test by different flotability between the loading-gold sulfide minerals with copper minerals. After selection of times, the obtained gold concentrate is insoluble and cannot be directly cyanide, but it can be fired in the double chamber fluidized bed furnace and then cinder carried cyanide [3] gold extraction operations.

Condition tests of rougher flotation

Test of grinding fineness

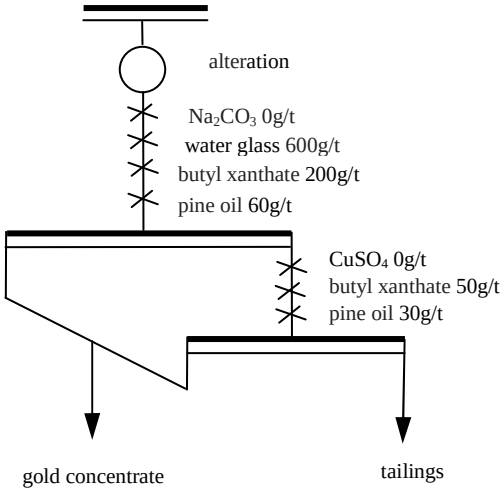

Figure 1 flotation process of grinding fineness

This test investigated the effects of grinding fineness to index of flotation, select parameters: water glass amount of 600g / t, butyl xanthate 200 + 50g / t, pine oil 60 + 30g / t (Figure 1).

Figure 2 showed, When the grinding fineness of -0.074mm85%, gold minerals monomer dissociation, gold concentrate grade of 30.40g / t, recovery was 80.15%, the result is better. Comprehensive nsideration, determine the grinding fineness of -0.074mm85%.

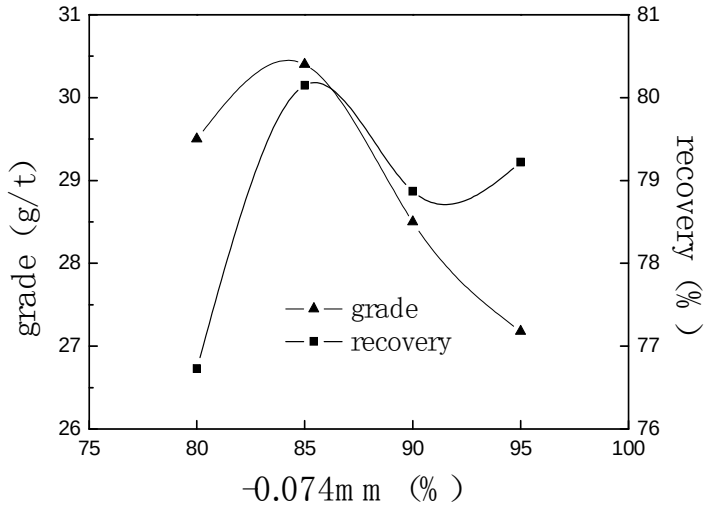

Figure 2 the results of test of grinding fineness

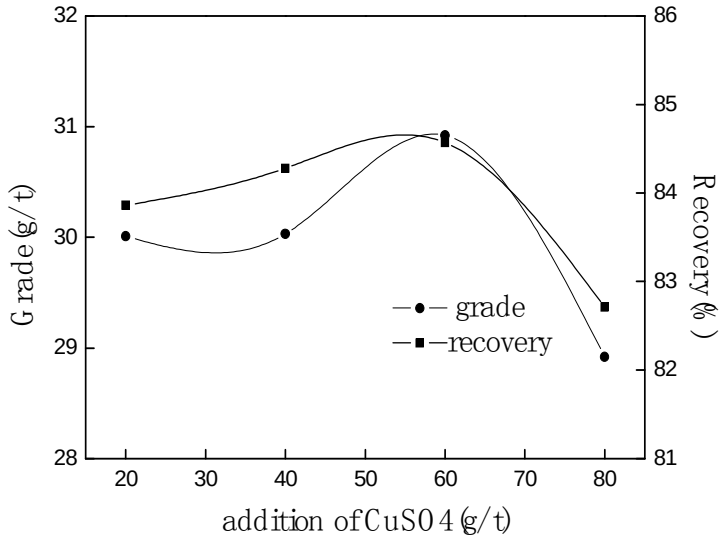

Figure 3 the results of test of dosage test of $CuSO_4$

Dosage test of adjusting agent Na_2CO_3. Na_2CO_3 is not only pulp adjusting agent, but also oxidized arsenopyrite activator The test pulp weakly acidic, its natural pH between 6 to 7, to ensure that collectors play the biggest role, investigated the effects of dosage of Na_2CO_3 to index of flotation, test ultimately determine the dosage of Na_2CO_3 800g / t.

Dosage test of $CuSO_4$ activator. In the flotation process, adding few $CuSO_4$ can improve the surface properties of pyrite and arsenopyrite, increase its floatability, ioint action with Na_2CO_3, capable of activating oxidized arsenopyrite. This test investigated the effects of dosage of CuSO4 to index of flotation, select the grinding fineness -0.074mm85%, water glass dosage of 600g / t, Na_2CO_3 800g / t, butyl xanthate 200 + 50g / t, pine oil 60 + 30g / t.

Figure 3 showed, When dosage of $CuSO_4$ 60g / t, gold concentrate grade of 30.92g / t, the recovery was 84.57%, the result is better.

Dosage test of butyl xanthate collector. This test investigated the effects of dosage of butyl xanthate to index of flotation, select the grinding fineness -0.074mm85%, water glass in an amount of 600g / t, $CuSO_4$ 60g/t, pine oil 60 + 30g / t.

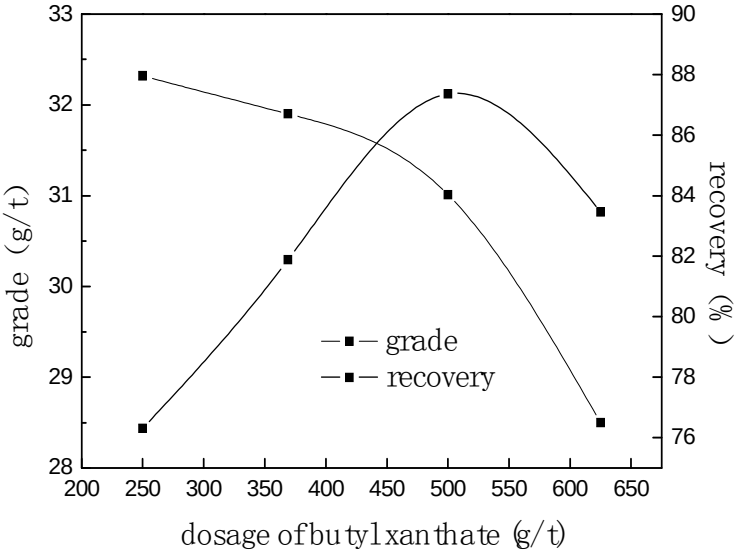

Figure 4 the results of test of dosage test of butyl xanthate

Figure 4 showed, when the dosage of butyl xanthate 400 + 100g / t, gold concentrate grade of 31.01g / t, the recovery was 87.36%, the result is better. Therefore, optimum dosage of butyl xanthate collector is 400 + 100g / t.

CONCLUSION

A low-grade, high arsenic goldmine in Agu village Yongping County, Yunnan Province, it belongs to the quartz vein type goldmine , most of the gold is wrapped by pyrite and arsenopyrite, small by oxidized arsenopyrite, pyrite and arsenopyrite total content of 85.56%.

Contained gold minerals in the ore disseminated fine-grained, need to ground finely. Tests showed: the grinding fineness reach -0.074mm85% in order to obtain a better flotation.

Contained gold minerals are pyrite, arsenopyrite and oxidized arsenopyrite, large differences flotability, need to add Na_2CO_3 and $CuSO_4$ to activation of the oxidized arsenopyrite to improve flotation recoveries.

This test showed, used a mixed flotation to recovery the contained gold minerals, determined the optimum process parameters: grinding fineness -0.074mm85%, Na_2CO_3 dosage of 800g / t, water glass 600g / t, $CuSO_4$60g / t, butyl xanthate 400 + 100g / t, and pine oil 60 + 30g / t, a fine quality gold concentrate was obtained with the grade of 31.01g/t, comprehensive gold recovery of 87.36%.

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