

GOLD FIELDS



Testwork using the Aachen Reactor at Beatrix

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1. Introduction



Objectives

- Improve leach kinetics by using Aachen reactor
- Improve Cyanide Consumption through pre-oxidation
- Effect Cyanide Destruction

I will not get injured today

2. Aachen Reactor



- **Excellent bubble generator: 300um**
- **Pressure chamber: Turbulence and mixing create**
- **Oxygen injection in the chamber ensures DO > 30mg/L**
- **Simple pipe reactor**

Eliminate unsafe behavior

2. Aachen Reactor



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Strive for free injury performance

2. Aachen Reactor



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Strive for free injury performance

3. Pre-oxidation



- Depletion of cyanide and oxygen by sulphides:



- If FeS is pre-oxidised:



- The formation of $\text{Fe}(\text{OH})_3$ inhibits further cyanide depletion

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3. Pre-oxidation



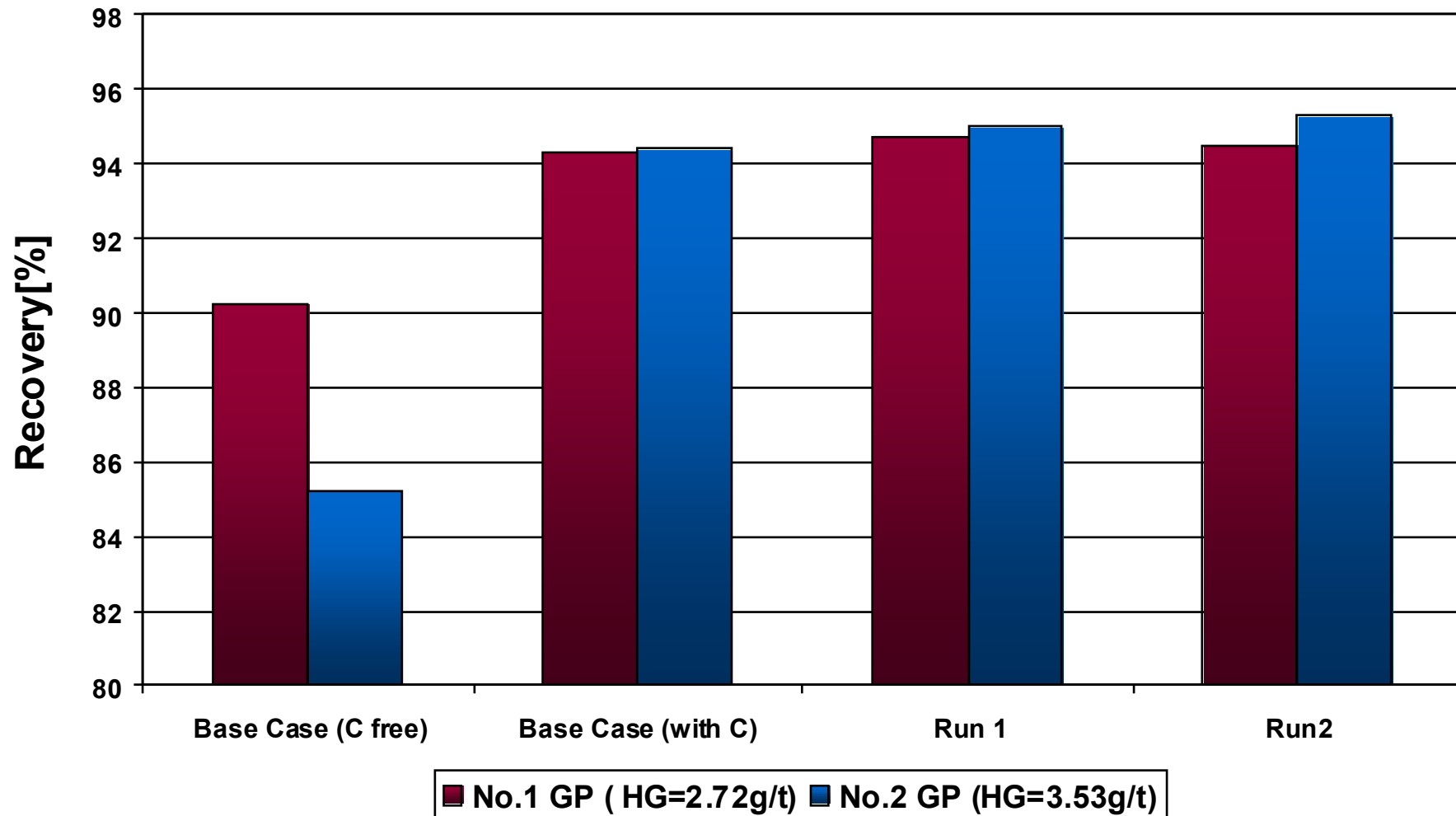
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Typical operating parameters

Time[min]	Number of passes	pH	Temp.[oC]	D.O.[mg/L]
0	0	10.44	23.1	10.3
5	6	10.14	28.3	23.7
10	11	9.90	32.0	26.3
15	17	9.70	35.1	25.9
20	22	9.65	37.1	28.0
25	28	9.28	39.0	31.5

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3. Pre-oxidation



3. Pre-oxidation



Gold Price = R 140,000.00

	Recovery Change	Additional Revenue/mth	Additional Cost/month	Conclusion
No.1 GP	+0.3%	R 420,000.00	R 360,000.00	No Go
No.2 GP	+0.6%	R 336,000.00	R 360,000.00	

Residual Cyanide Change = -21 ppm

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4. Leaching



➤ **Heterogeneous reaction:**

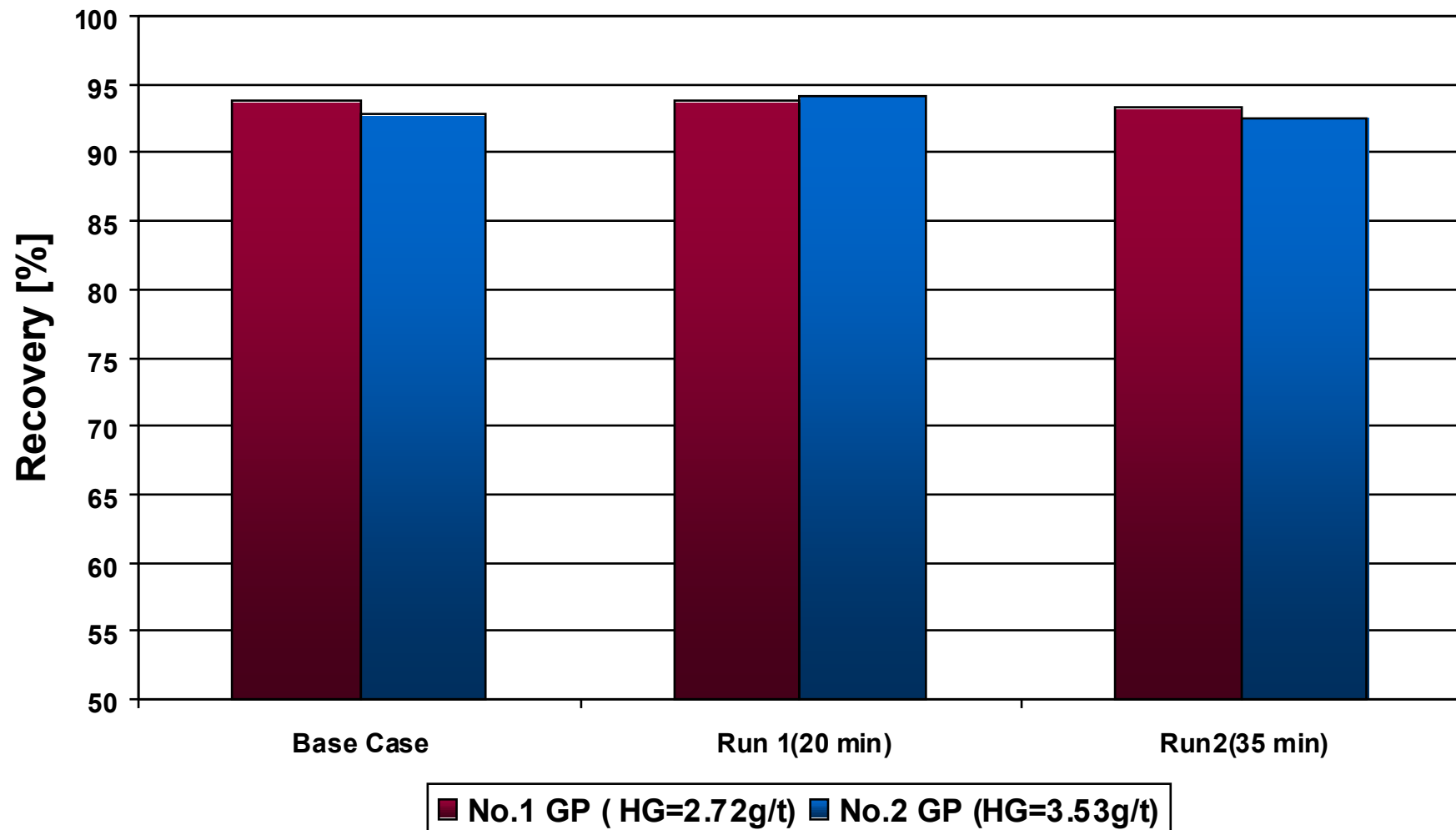


Requires:

- **Sufficient reagent concentration**
- **Good agitation**

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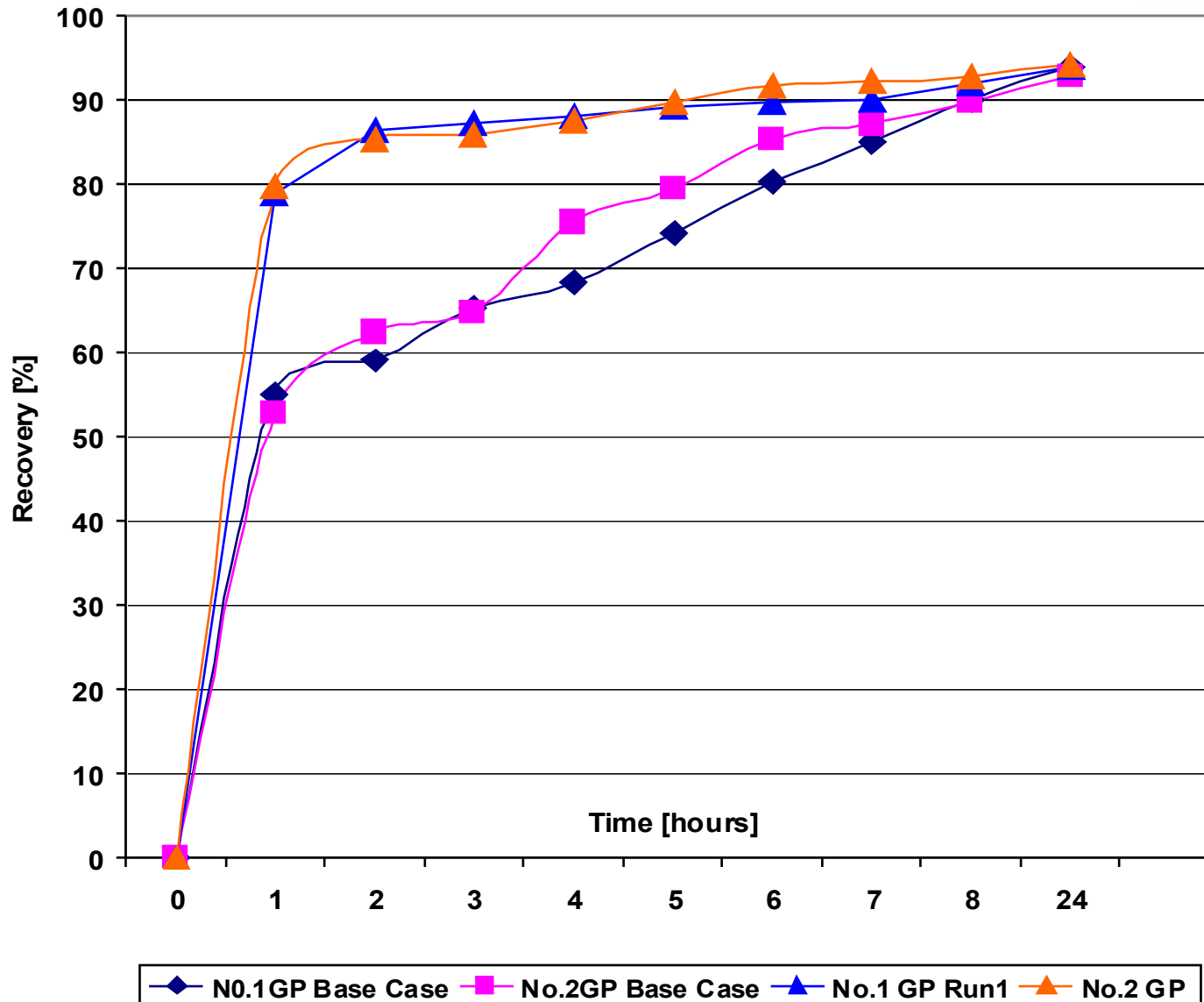
4. Leaching



4. Leaching



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5. Cyanide Destruction



Procedure:

- Run the Aachen reactor for a total of 40 minutes
- 30L of sample transferred to the reactor tank
- Take samples every 10 minutes

No.1 GP Run

- Add 50 ppm CuSO_4 after 30 minutes

No.2 GP Run

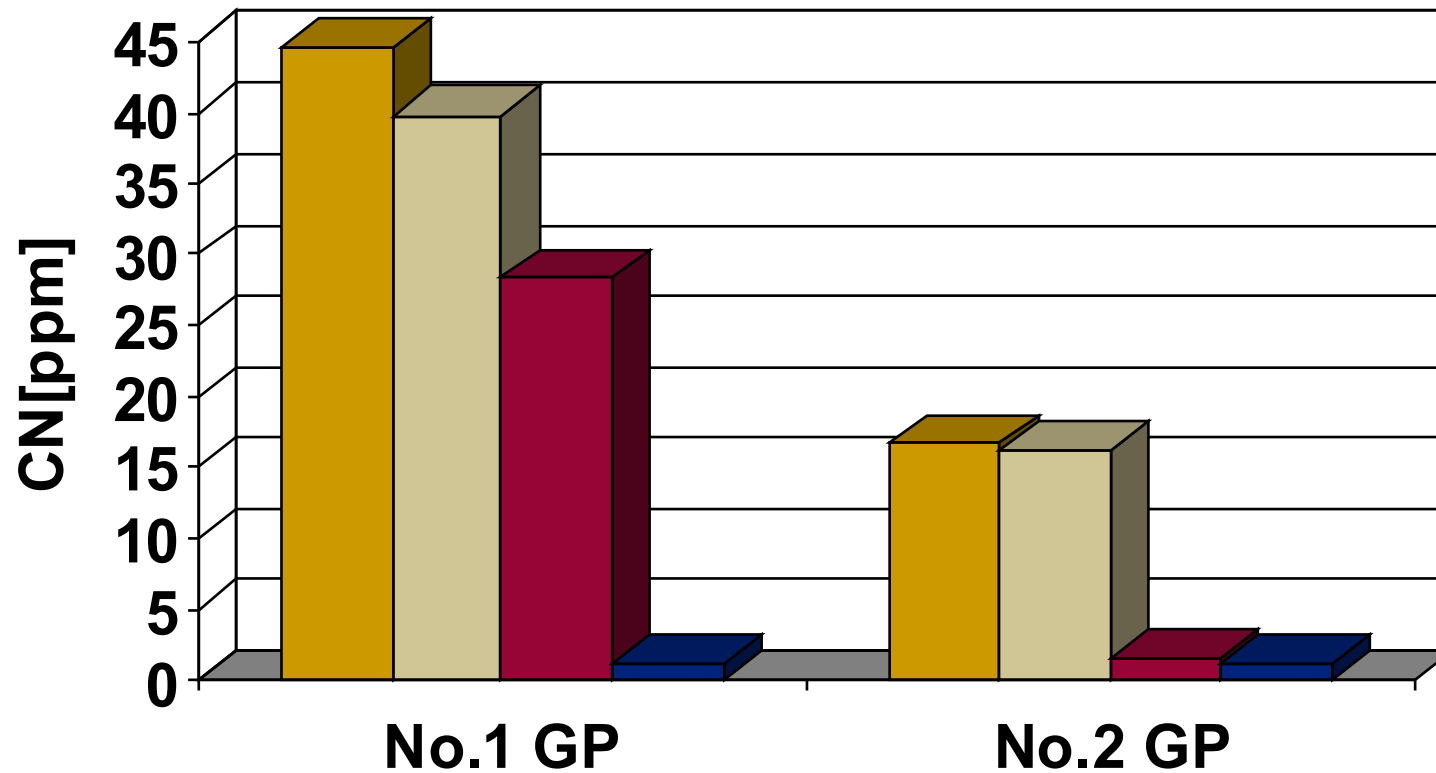
- Add CuSO_4 before starting the reactor. Test also with a mixture of CuSO_4 , ZnSO_4 and FeSO_4

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5. Cyanide Destruction

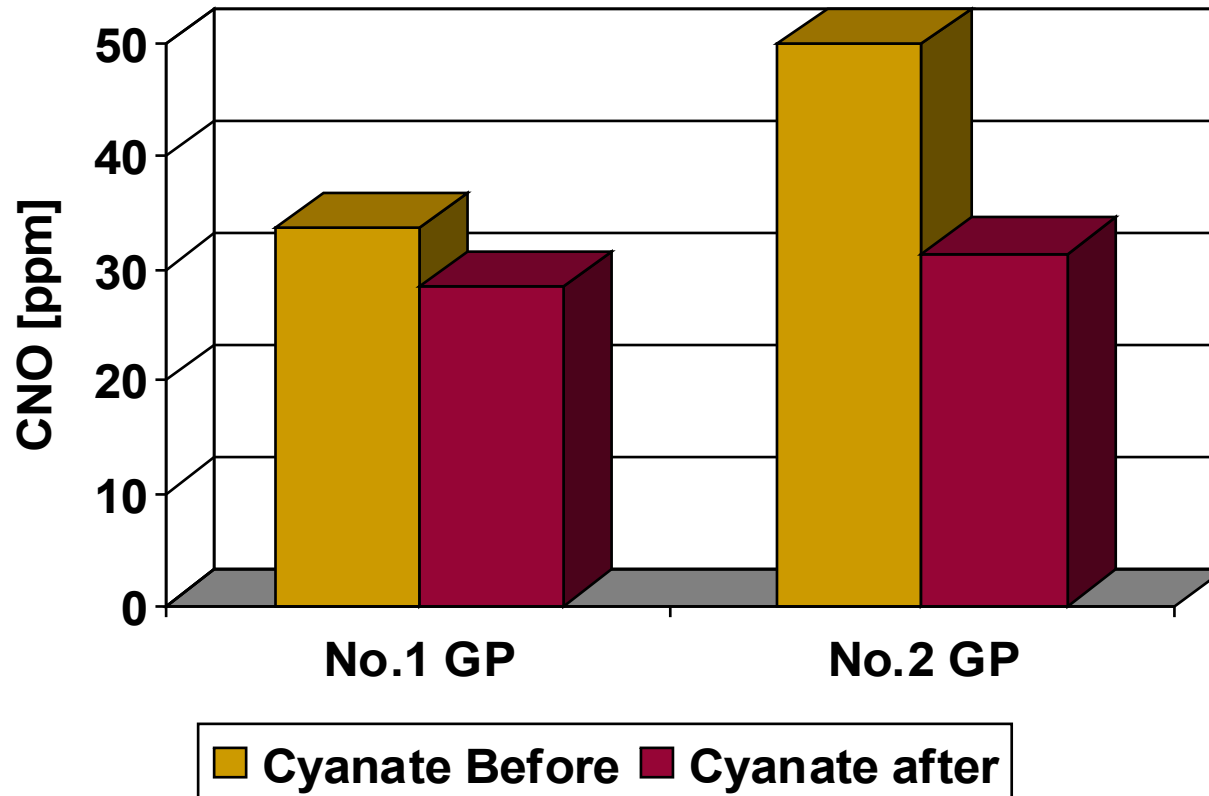


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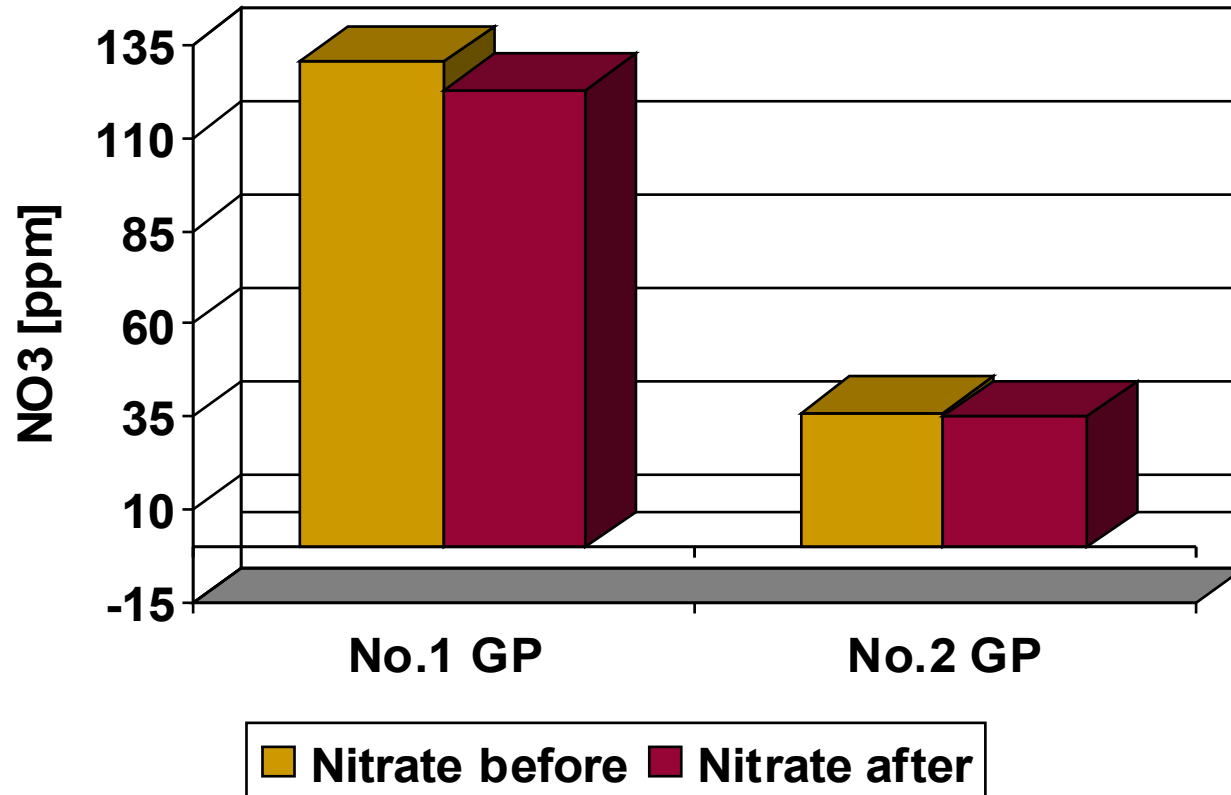


■ WAD CN Before ■ WAD CN After
■ Free CN Before ■ Free CN After

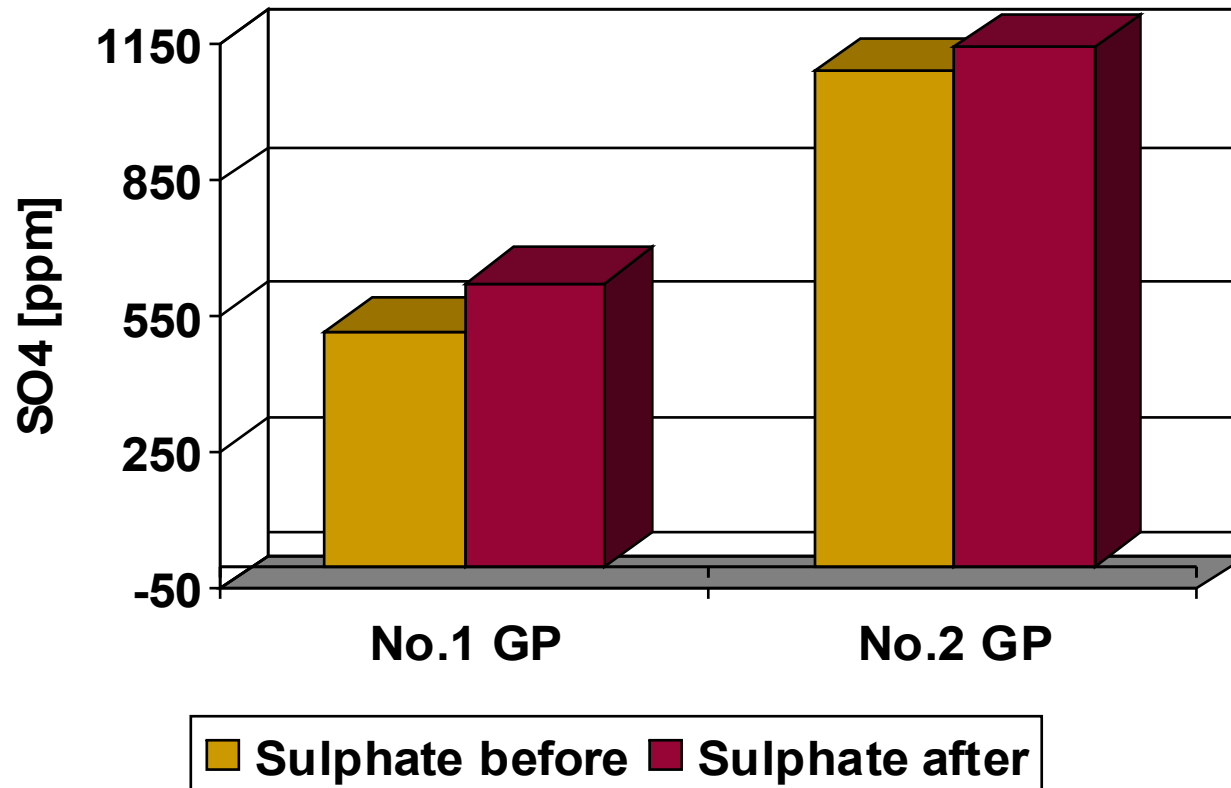
5. Cyanide Destruction



5. Cyanide Destruction



5. Cyanide Destruction



6. Conclusion



- The pre-oxidation and the leaching using the Aachen reactor have not improved the overall recovery. However, a slight cyanide saving is noticed.
- A slight cyanide destruction is observed when using O_2 . The reaction is improved when $CuSO_4$ is added.
- Further investigation into the cyanide destruction using different oxidising reagents should be effected.

Eliminate unsafe behavior



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Questions?