

# MEMORANDUM

To H.E. Pawson; R.J. Tucker  
From C.Q. Olesen

Date Nov 14/75  
Ref.

Subject The use of  $\text{CuSO}_4$  as an arsenic suppressant for thickeners #6, #11, #13.

## Procedure:

Samples from 6, 11 and 13 thickeners were subjected to  $\text{CuSO}_4$ , read and then made ammoniacal with 6 drops of concentrated  $\text{NH}_4\text{OH}$ .

### Part I - #6 thickener (sample sizes 500ml)

Amt $\text{CuSO}_4$ (g)	ppm As	6 drops $\text{NH}_4\text{OH}$ ppm As	% As Removal
0.00	30.0	-	-
0.05	21.0	18.0	40
0.10	16.5	13.0	56.7
0.15	19.2	12.0	60.0
0.25	29.5	9.0	70.0
0.50	25.0	3.0	90.0

### Part II - #11 thickener (sample sizes 500 ml)

Amt $\text{CuSO}_4$ (g)	ppm As	6 drops $\text{NH}_4\text{OH}$ ppm As	% As Removal
0.00	135	-	-
0.40	125	11.0	91.9
0.45	125	2.0	98.5
0.50	126	3.0	97.8
0.75	126	2.0	98.5

### Part III - #13 thickener (sample sizes 1 litre)

Amt $\text{CuSO}_4$ (g)	ppm As	6 drops $\text{NH}_4\text{OH}$ ppm As	% As Removal
0.0	500	-	-
5.0	480	200	60
6.0	480	400	20
6.5	480	170	66
7.0	480	240	50
8.0	470	300	40

## Calculations:

### Part I

Available Cu (mg)	Consumed As (mg)	theoretical Cu 3 Cu:2 As	theoretical Cu 3 Cu: As
12.7	6	7.6	15.3
25.4	8.5	10.8	21.6
38.2	9.0	11.5	22.9
63.6	11.5	14.6	29.3
127.2	13.5	17.2	34.4

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## Part II

<u>Available Cu (mg)</u>	<u>Consumed As (mg)</u>	<u>theoretical Cu 3 Cu: 2As</u>	<u>theoretical Cu 3 Cu: As</u>
101.8	62	78.9	157.9
114.5	66.5	84.7	169.4
127.2	66	84.0	168.1
190.0	66.5	84.7	169.4

## Part III

<u>Available Cu (mg)</u>	<u>Consumed As (mg)</u>	<u>3 Cu: 2As</u>	<u>3 Cu : As</u>
1272	300	382.0	764
1527	100	127.3	254.7
1654	330	420.2	840.4
1781	260	331.1	662.1
2036	200	254.7	509.3

## Conclusions:

- the ppte evolved from the experiments were green in color and could presumable be a  $\text{Cu}_3\text{As}_2$  complex. If this is the case, that it is a copper arsenite, then the complex is very insoluble in hot or cold water.
- with the addition of ammonium hydroxide to the samples the suppression of arsenic becomes very noticeable (i.e. 135 - 3.0 ppm As)
- the use of copper sulphate and ammonium hydroxide therefore seems very plausible.