

## Treatment for Removal of H<sub>2</sub>S-like Aromas\*

by Dr. Murli Dharmadhikari

### Copper sulfate trial

The first step in copper treatment is to experimentally determine the amount of copper needed for the wine treatment. This can be achieved by following the procedure given below.

1. Prepare a 1 % copper sulfate solution. To make this solution weigh 1 gram of copper sulfate (CuSO<sub>4</sub> · 5H<sub>2</sub>O), dissolve in a small amount of distilled water in a 100 ml volumetric flask and bring to volume. Label this as 1 % copper sulfate solution.
2. Prepare a 0.004% copper sulfate solution for the trial by pipetting 1.0 ml of 1 % copper sulfate solution into a 250 ml volumetric flask and bring the volume up to 250 ml with distilled water. Label this copper sulfate solution as "stock solution, 0.004% copper sulfate." Be careful not to confuse the two copper sulfate solutions.
3. Label five 100 ml volumetric flasks with numbers 1 through 5.
4. Set flask number 1 aside and pipette 0.5 ml, 1.0 ml, 1.5 ml, and 2.0 ml of .004% copper sulfate solution into flask numbers 2, 3, 4, and 5 respectively.
5. Add wine to all the flasks to bring the volume to 100 ml. Mix the contents well, close the flasks and leave for several hours. Note that 1 ml of 0.004% copper sulfate solution in 100 ml of wine equals 0.1 ppm of copper. The concentration of copper in the various flasks will be as follows:

Table 1.

Flask #	ml of 0.004% copper sulfate added	Concentration of copper in 100 ml of wine (ppm)
1	0.0	0.00
2	0.5	0.05
3	1.0	0.10
4	1.5	0.15
5	2.0	0.20

6. After allowing some time (several hours or preferably overnight) for the copper to react with H<sub>2</sub>O, the samples should be ready for evaluation.
7. To evaluate the improvement in aroma, the wine from flask number 1 should be compared by sniffing with wines from flasks 2 through 5.

The amount of copper needed to treat a wine can be determined by selecting the sample showing maximum aroma improvement (disappearance of H<sub>2</sub>S odor) with the least amount of copper added.

If the copper addition of .05 to 0.2 ppm does not remove the objectionable odor, higher levels of copper up to 0.5 ppm can be tried. Most of the added copper will react with H<sub>2</sub>S and will be lost in racking after the treatment. However, a small portion of it could remain in the wine, and the vintner must make sure that the residual copper level in the finished wine does not exceed 0.2 ppm.

Persistence of the dirty and unpleasant H<sub>2</sub>S-like odor after copper treatment may be due to the presence of a complex sulfur compound such as dimethyl disulfide. This compound does not react with copper; to remove it, the wine needs to be treated with ascorbic acid, which will convert dimethyl disulfide to a more reactive species such as methyl mercaptan. After the ascorbic acid additions, a copper addition trial should be conducted to determine the amount of copper needed to treat the flawed wine.

Copper addition to wine—Copper addition to the entire lot of wine should be considered only after the correct amount of copper to be added is experimentally determined. For the copper treatment, a 1 % copper sulfate solution should be used. The correct amount of 1 % copper sulfate solution required can be obtained from the following table.

Table 2.

ppm copper required	ml of 1 % CuSO <sub>4</sub> · 5H <sub>2</sub> O solution required		
	per gal	per 10 gal	per 100 gal
0.05	0.075	0.75	7.5
0.10	0.150	1.50	15.0

0.15	0.225	2.25	22.5
0.20	0.300	3.00	30.0
0.25	0.375	3.75	37.5
0.30	0.450	4.45	44.5
0.35	0.525	5.25	52.5
0.40	0.600	6.00	60.0
0.45	0.675	6.75	67.5
0.50	0.750	7.50	75.0

The copper sulfate solution should be added while gently stirring the wine. After a couple of days, the wine should be evaluated for aroma improvement, then filtered to remove the residual copper.

Residual copper must be tested to make sure the amount is low enough to comply with BA TF regulations and to ensure shelf life. This can be achieved by getting a commercial wine laboratory to do the copper determination.

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