The effect of HOCL CCS Solutions on moisture and humidity on various Musical Instruments

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Introduction:

HOCL is a unique substance that has properties that make it very suitable for use in disinfection of various objects. It is completely natural, environmentally friendly, safe to humans and a large variety of materials and a powerful disinfectant. It kills 99.999% of all pathogens including Covid 19.

The musical instruments teaching industry has been severely affected by the pandemic as a safe method of disinfecting instruments and associated equipment such as music stands (wood and metal) between students /lessons without causing damage to, often, expensive instruments has yet to be determined. It is clear that if a safe method could be designed using an appropriate disinfectant, this industry would be transformed.

Hypothesis

HOCL CCS Solutions is an appropriate disinfectant that causes no damage to musical instruments and can be used to disinfect instruments between students/lessons.

Aim

To independently test the effect of HOCL CCS Solutions on instrument performance and moisture.

Materials and methods

1) Measure temperature and keep constant
2) Use a cool, dry area away from sunlight
3) Parameters to test –
    A. Performance of instrument
    B. Moisture levels post fogging
    C. Drying time after fogging
    D. Humidity levels
4) Instruments to test
    A. Clarinet (Modern and Classical Instrument)
    B. Bassoon
    C. Viola/Violin
5) Test areas per instrument

    A. Clarinet
        I. BARREL AND BELL

    B. Bassoon
        I. BELL JOINT AND DOUBLE JOINT
        II. CORK PADS

III. LEATHER PADS

C. Violin/Viola
   I. WOOD AROUND THE LOWER BOUT
   II. BOW HAIR

Process

1 Musician to use instrument prior to testing and 10 minutes after testing for subjective assessment of performance. Please score on a scale of 1-10. 1 being normal and 10 being abnormal
2 Using a moisture monitor measure the moisture from all the selected areas for each instrument and record
3 Using a Fogsafe Method fog the instrument adequately to ensure total coverage.
4 Repeat a moisture test for all areas immediately after fogging, at 5 minutes and at 10 minutes. If moisture content at 10 minutes is higher than base line do a further test at 15 minutes
5 Video the whole process

Measurement tools

Moisture Measuring Tool: EXTECH DUAL MOISTURE METER (MO55)

Temperature and Humidity measuring tool: MENGSHEN DIGITAL PSYCHROMETER (M86)

Independence

These tests were conducted by Mr Robert Kendell, a professional musician himself and CEO of DONAU Express Services LTD, a specialist cleaning company. He had independent witnesses to the tests who were the owners of the instruments (again respected professional musicians).

Results: Moisture levels and humidity

Bassoon – Oliver Ludlow	Pre fogging	Immediate post fogging	5mins post fogging	10mins post fogging
Top Section of Wood	0	0	0	
Cork or Tenon Joint	5.5	6.4	5	
Leather Pad	5.7	6.8	5.1	
Temperature 14.5 centigrade		Humidity before 53 After 53		

Clarinet - Fiona Orford	Pre fogging	Immediate post fogging	5mins post fogging	10mins post fogging
Modern Clarinet	13.5	14	13.3	
Classical Clarinet	11.8	13.3	11.8	
Suede Cloth Suede Cloth with extensive fogging Silk Cloth	3.7 3.7 3.5	3.7 14.2 3.7	 3.7 3.5	
Temperature 12.55 Centigrade		Humidity Before 45		After 46

NB: It was decided to test the cleaning cloths that pass through the inner bore of the clarinet. We tested two types of material that make up each individual cloth, suede and silk. It is common practice for wind instrumentalists to clean out their instruments after a period of play as condensation forms within the inner bore and this often accumulates and drips out of the bell or end of the instrument onto the floor. It might be an idea to treat the cleaning materials with non- diluted fluid which will then be pushed through the bore when the player cleans the instrument thus killing any bacteria or virus within the instrument. For the second suede cloth test, we placed the Foggsafe Method over the material for 20 seconds thus giving time to penetrate the entire cloth. Even with this, after 2 minutes, the suede reverted back to its nominal moisture. It was decided to test both a Modern and a Classical as the wood used in each instrument differs. Although the moisture reading in the Classical instrument increased at a higher percentage, it reverted to the initial reading within 5 minutes.

Viola – Lucy Gould	Pre fogging	Immediate post fogging	5mins post fogging	10mins post fogging
Viola - Wood	5.4	6.6	5.4	
Violin - Wood	5.6	6.5	5.5	
Visual Drying Time	5 seconds		After 2 minutes	
Bow Hair Test	4.3	5.5	4.2	
Temperature 12.25 centigrade		Humidity Before 67.6% After test 67.4%		

NB: It was at the suggestion of Lucy that we tested the hair on the bow as she stated that the it is the hair, that reacts more extreme to moisture or humidity levels causing a difference in tone production as the hair passes across the strings. After very careful fogging, Lucy noticed a slight difference in tone production and indeed the moisture level increased by 28%. After a short period, less than 2 minutes, the moisture reading receded to under the initial reading.

Instrument performance score

Instrument	Before Test	After Test
Modern Clarinet	1	1
Classical Clarinet	1	1
Bassoon	1	1
Viola/Violin	1	1

Analysis

The results were analysed and are in tables below

Instrument and area	Post fogging increase in moisture	Time to return to normal
Bassoon -Wood	0%	Immediate
Bassoon – Cork/tenon joint	16%	5 minutes
Bassoon - Leather pad	19%	5 minutes
Modern Clarinet	14%	5 minutes
Classical Clarinet	12.8%	5 minutes
Clarinet - Suede cloth normal fogging	0%	Immediate
Clarinet - Suede cloth extensive fogging	283%	5 minutes
Clarinet - Silk cloth	6%	10 minutes
Viola -Wood	26%	5 minutes
Violin -Wood	16%	5 minutes
Viola -Bow hair	28%	5 minutes

Humidity change after fogging	
Bassoon	Zero
Clarinet	2%
Viola	Zero

So the analysis showed

1. There was an increase in moisture in all recordings except two
2. The increase was significant but returned to normal in 5 minutes
3. Extensive fogging of the suede cloth increased the moisture to over 200% but returned to normal within 2 minutes
4. There was little change in the humidity of all instruments
5. From a performance point of view there was no change post fogging

Conclusions

We already know that HOCL CCS Solution is extremely effective in disinfection and is safe to humans. These tests have also confirmed that fogging various instruments does not cause any detrimental effect in performance and does not cause any sustained increase in humidity or moisture levels.

We recommend HOCL CCS Solution to be used by fogging using Fogsafe Method to disinfectant instruments between students/lessons.