**Working During COVID-19 Pandemic**

**STANDARD OPERATING PROCEDURE (SOP) - DRAFT**

**Type of SOP:** Disinfection procedure to reduce the risk of SARS-CoV-2 in the workplace

**All personnel who are subject to these SOP requirements must review the completed SOP and sign the associated training record. Completed SOPs must be kept with the UC Davis Laboratory Safety Manual or be otherwise readily accessible to laboratory personnel. Electronic access is acceptable. SOPs must be reviewed, and revised where needed, as described in the** [**UC Davis Laboratory Safety Manual**](http://safetyservices.ucdavis.edu/article/laboratory-safety-manual)**. The unique properties of each chemical must be considered when preparing a SOP.**

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| Date SOP Written:  | 07 May 2020 |  | Approval Date: |  |
| SOP Prepared by: | **Lucy Joseph** |
| **RMI Joint Safety Committee** |
| SOP Reviewed and Approved by (name/signature): | **Principal Investigator** |
| Department:  | **REQUIRED - Insert Name**  |
| Principal Investigator/Laboratory Supervisor:  | **REQUIRED - Insert Name** | Contact:  | **REQUIRED - Insert Phone# or email** |
| Lab Manager/ Safety Coordinator:  | **REQUIRED - Insert Name** | Contact:  | **REQUIRED - Insert Phone# or email** |
| Emergency Contact(s):  | **Lucy Joseph** | Contact:  | **530-752-1809 cmjoseph@ucdavis.edu** |
|  | **Vanessa Lieberman** |  | **530-752-2826    vmmorales@ucdavis.edu** |
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| Location(s) covered by SOP: | Building: | **RMI Complex**  | Lab Phone: |  |
| Room #(s):  | **All rooms** |

1. **HAZARD OVERVIEW**

COVID-19 is the disease state that results from an infection with a novel coronavirus called SARS-CoV-2. Information from the World Health Organization (WHO) and the Center of Disease Control and Prevention (CDC) states that the virus is transmitted via respiratory droplets from infected individuals. Evidence also suggests that transmission of the virus may occur through contact with contaminated surfaces. Transmission of the virus via asymptomatic carriers has also been documented.

1. **SCOPE/RISK TO PERSONNEL**

Currently there is no laboratory in the Department of Food Science and Technology or the Department of Viticulture and Enology that performs work with infectious forms of SARS-CoV-2, and as a result, this SOP will focus on reducing exposure to employees through community transmission.

1. **CONTAINMENT**

Employees may contract the virus through interactions with infected individuals in a public setting or in a private residence. The CDC (cdc.gov) recommends the following infection prevention measures:

* Actively encouraging sick employees to stay home.
* Sending employees with acute respiratory illness symptoms home immediately.
* Providing information and training to employees on:
	+ Cough and sneeze etiquette.
	+ Hand hygiene.
	+ Avoiding close contact with sick persons.
	+ Avoiding touching eyes, nose, and mouth with unwashed hands.
	+ Avoiding sharing personal items with coworkers (i.e., dishes, cups, utensils, towels).
	+ Providing tissues, no-touch disposal trash cans, and hand sanitizer for use by employees.
	+ Proper use of PPE including face masks/face coverings, gloves, safety eyewear,
	and lab coats.
* Performing routine environmental cleaning of shared workplace equipment and furniture (disinfection beyond routine cleaning is not recommended). See Section 10 and 11.

Principal Investigators (PIs), lab managers, supervisors, and personnel are encouraged to check the CDC guidelines regularly, so that they are up-to-date with the latest infection prevention measures.

<https://www.cdc.gov/coronavirus/2019-ncov/community/organizations/businesses-employers.html>

PIs, supervisors, and all other personnel should be aware of the dangers of working in a pandemic. We all share responsibility for our own health and the health of others.

1. **HAZARDOUS CHEMICAL(S)/CLASS OF HAZARDOUS CHEMICAL(S)**

When working during a pandemic, work areas must be disinfected (see Section 10 and 11). Disinfectants can also be hazardous chemicals. Disinfectants that are effective against SARS-CoV-2, including contact times, are available from the EPA:

<https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2>

Some disinfectant formulations are proprietary, so it may be necessary to consult the manufacturer’s Safety Data Sheet (SDS) of your proprietary disinfectant for associated hazards. The list of hazardous chemicals below represent the most common active ingredients in disinfectants that might be used against SARS-CoV-2. Further resources regarding disinfectants are:

<https://www.cdc.gov/infectioncontrol/guidelines/disinfection/disinfection-methods/chemical.html>.

<http://www-ehs.ucsd.edu/bio/disinfectants_chart.html>

1. **Quaternary Ammonium Compounds (QACs)**

QACs are found in many forms, including benzalkonium chloride, benzethonium chloride, methylbenzethonium chloride, cetalkonium chloride, cetylpyridinium chloride, cetrimonium, cetrimide, dofanium chloride, tetraethylammonium bromide, didecyldimethylammonium chloride and domiphen bromide. Some forms are not considered antimicrobial. For more info see: <https://en.wikipedia.org/wiki/Quaternary_ammonium_cation>).

The hazards associated with QACs include skin irritation, reproductive defects, and death. The hazard associated with a product is a result of both the QAC itself and the dilution of the QAC in the proprietary solution. Carefully read the SDS of your proprietary solution and the instructions for use to minimize hazards.

QACs are beneficial in the treatment of porous surfaces (i.e. wood, clothing, etc.) and are not generally corrosive to metal. Generally, QACs, even when diluted, have a long shelf life. However, they can be deactivated in the presence of common soaps. The residuals will also most likely stay on surfaces unless removed by washing with soap/water. Depending on the formulation of your product, it may or may not act as a cleaning agent, areas that are not clean cannot usually be disinfected. The amount of time that a surface has to stay in contact with a QAC in order to disinfect varies according to its formulation, read the instructions for your formulation to determine contact times.

1. **Ethanol**

In general, ethanol is effective in killing microorganisms. It does so by disrupting the membrane lipid bilayer and denaturing proteins. It is effective against most bacteria, fungi, and viruses. Ethanol is the most effective as a 70% solution in water, with a recommended contact time of 10 minutes. As the surface dries, you must reapply. A higher concentration of ethanol is not better. Similarly, absolute ethanol should not be used as a disinfectant, as it is not nearly as effective. Generally, diluted ethanol has a 3-6 month shelf life.

Ethanol is a highly flammable volatile liquid (H225) and should not be used around an ignition source due to fire danger. Ethanol is also an irritant to the skin (H319) and can be fatal if swallowed. The SDS for 96% ethanol can be found [here](https://www.sigmaaldrich.com/MSDS/MSDS/DisplayMSDSPage.do?country=US&language=en&productNumber=493511&brand=SIAL&PageToGoToURL=https%3A%2F%2Fwww.sigmaaldrich.com%2Fcatalog%2Fsearch%3Fterm%3Dethanol%26interface%3DAll%26N%3D0%26mode%3Dpartialmax%26lang%3Den%26region%3DUS%26focus%3Dproduct). There is no residual left by ethanol, other than that left by the diluent (i.e. water).

1. **Isopropanol**

Isopropanol, or Isopropyl alcohol, is effective in killing microorganisms. It works with the same mechanisms as ethanol. Isopropanol should be used as a 70-75% solution in water to act as a disinfectant, with a contact time of 10 minutes. As the surface dries, you must reapply, although it dries more slowly than ethanol. As with ethanol, a higher concentration of isopropanol is not more effective. Generally, diluted Isopropanol has a 3-6 month shelf-life.

Isopropanol is also highly flammable (H225), but not as volatile as ethanol. It is an irritant (H319) and can cause drowsiness/dizziness (H336) if excess fumes are inhaled. The SDS for isopropanol can be found [here](https://www.sigmaaldrich.com/MSDS/MSDS/DisplayMSDSPage.do?country=US&language=en&productNumber=I9516&brand=SIGMA&PageToGoToURL=https%3A%2F%2Fwww.sigmaaldrich.com%2Fcatalog%2Fsearch%3Fterm%3Dipa%26interface%3DAll%26N%3D0%26mode%3Dmatch%2520partialmax%26lang%3Den%26region%3DUS%26focus%3Dproduct).

1. **Bleach (sodium hypochlorite)**

Bleach is a very effective disinfectant with sodium hypochlorite as the active ingredient. Bleach is sold as a 3-8% solution of sodium hypochlorite in water. The CDC is recommending solutions of 1,000 ppm sodium hypochlorite (0.12%), which can be found [here](https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/cleaning-disinfection.html). Michigan State University has released an article providing recipes on how to properly dilute commercial bleach to this dilution with varying starting concentrations of sodium hypochlorite, it can be found [here](https://www.canr.msu.edu/news/covid-19-disinfecting-with-bleach). Dilute bleach has a shelf-life of hours or minutes and should be used immediately as a disinfectant. Sunlight (or UV) will deactivate diluted bleach very quickly.A contact time of 10 minutes is suggested for disinfection. Following disinfection, the surface should be wiped with clean water to remove residue.

Bleach will remove color from fabrics and is corrosive (H314) to metal. It is a strong oxidizer, so chemical compatibility must be assessed when using bleach. For example, bleach can react with dishwashing soap that contains ammonia to form chloramine gas, which is toxic. Bleach will also react with acids (including vinegar) to release chlorine gas, which is highly toxic. Bleach itself is toxic, an irritant, and corrosive. All appropriate PPE must be worn when using bleach. The SDS for Clorox household bleach is [here](https://www.thecloroxcompany.com/wp-content/uploads/cloroxregular-bleach12015-06-12.pdf).

1. **Other common disinfectants**

Other common disinfectants include those based on iodine and peroxide. Iodine and peroxide based disinfectants can be effective against viruses, but the use of these to disinfect against SARS-CoV-2 should be verified prior to use.

1. **ENGINEERING/VENTILATION CONTROLS**

 Disinfectants, if used as directed, should not require engineering or ventilation controls.

1. **ADMINISTRATIVE CONTROLS**

 The following elements are required:

1. Complete the [UC Laboratory Safety Fundamentals](http://safetyservices.ucdavis.edu/training/uc-laboratory-safety-fundamentals) (or approved equivalent) training prior to working in the laboratory;
2. Complete laboratory-specific safety orientation and training on laboratory-specific safety equipment, procedures, and techniques to be used, including any applicable laboratory-specific Laboratory Safety Plan(s), prior to receiving unescorted access to the laboratory;
3. Demonstrate competency to perform the procedures to the Principal Investigator (PI), Laboratory Supervisor, laboratory-specific Safety Officer, and/or trainer;
4. Be familiar with the location and content of any applicable Safety Data Sheets (SDSs) for the chemicals to be used (online SDSs can be accessed from [UC SDS](http://ucsds.com));
5. Implement good laboratory practices, including good workspace hygiene;
6. Inspect all equipment and experimental setups prior to use;
7. Follow best practices for the movement, handling, and storage of hazardous chemicals. An appropriate spill cleanup kit must be located in the laboratory. Chemical and hazardous waste storage must follow an appropriate segregation scheme and include appropriate labeling. Hazardous chemical waste must be properly labelled, stored in closed containers, in secondary containment, and in a designated location;
8. Do not deviate from the instructions described in this SOP without prior discussion and approval from the PI and/or Laboratory Supervisor;
9. Notify the PI or Laboratory Supervisor of any accidents, incidents, near-misses, or upset condition (*e.g.,* unexpected rise or drop in temperature, color or phase change, evolution of gas) involving the process, hazardous chemical(s), or hazardous chemical class described in this SOP; and
10. Abide by the laboratory-specific working alone SOP, if applicable.
11. A discussion with the PI is required before performing disinfection of laboratory surfaces. Some disinfectants will harm laboratory equipment or personnel if used incorrectly.
12. Check the labels on your disinfection solutions to see if there are any special handling or storage requirements.
13. Watch a video on handwashingand demonstrate competency. See: <https://youtu.be/IisgnbMfKvI>
14. Watch a video on glove removaland demonstrate competency. See: <https://www.youtube.com/watch?v=BOAb_cy3HxM&feature=youtu.be>
15. Watch a video on use and re-use of face masks and demonstrate competency. See: <https://www.youtube.com/watch?v=JwPWdkbyizw>
16. **Personnel who are sick, or suspect they are sick, with COVID-19 should notify their immediate supervisor, who will then notify the chair and the CAO.** The notification should be anonymous to comply with medical confidentiality. The lab should be closed immediately, signage posted for no entry (noting there was a COVID-19 case) and campus cleaning protocols will be initiated. All personnel that have been in contact with the person or the lab should self-quarantine until testing can be done to confirm COVID-19. Deep disinfection of the lab upon receipt of a positive test for COVID-19 will be done by a vendor that has been contracted by UC Davis.

**6. PERSONAL PROTECTIVE EQUIPMENT (PPE)**

At a minimum, long pants (covered legs) and closed toe/closed heel shoes (covered feet) are required to enter a laboratory or technical area where hazardous chemicals are used or stored.

In addition to the minimum attire required upon entering a laboratory, the following PPE is required for *all work with hazardous chemicals*. PPE and hygiene practices should adhere to the manufacturers’ directions supplied with the disinfectant.

1. Eye Protection:
	* Eye protection must be ANSI Z87.1-compliant.
	* At a minimum safety glasses are necessary.
	* Splash goggles may be substituted for safety glasses, and are required for processes where splashes are foreseeable or when generating aerosols.
	* Ordinary prescription glasses will NOT provide adequate protection unless they also meet the Z87.1 standard and have compliant side shields.
2. Body Protection: At a minimum a chemically-compatible laboratory coat that fully extends to the wrist is necessary.
	* If a risk of fire exists, a flame-resistant laboratory coat that is NFPA 2112-compliant should be worn.
	* For chemicals that are corrosive and/or toxic by skin contact/absorption additional protective clothing (*e.g.,* face shield, chemically-resistant apron, disposable sleeves, etc.) are required where splashes or skin contact is foreseeable.
3. Hand Protection: Hand protection is needed for the activities described in this SOP (e.g., using chemical disinfectants). Define the type of glove to be used based on the following:
	* Chemical(s) being used;
	* Anticipated chemical contact (e.g. incidental, immersion, etc.);
	* Manufacturers’ permeation/compatibility data; and
	* Whether a combination of different gloves are needed for specific procedural steps.
4. Face masks/covering: Face masks and face coverings are not the same thing. Establish and follow guidelines for use of appropriate masks in your area, including the type of mask that is needed, if any, for handling the chemical disinfectants described in this document. Face coverings are currently required under Order of Yolo County as one tool in reducing the spread of the virus (SARS-CoV-2) that causes COVID-19. As defined in the Order, face coverings may be needed while working in the laboratory. Please refer to a separate document “CA&ES guidance for appropriate use of face coverings on campus, in university buildings, or in laboratories” for more details.
5. **SPILL AND EMERGENCY PROCEDURES**

Follow the guidance for chemical spill cleanup from [SafetyNet #13](http://safetyservices.ucdavis.edu/safetynet/guidelines-chemical-spill-control) and/or the [UC Davis Laboratory Safety Manual](http://safetyservices.ucdavis.edu/article/laboratory-safety-manual), unless specialized cleanup procedures are described below. Emergency procedure instructions for the UC Davis campus and UCD Medical Center are contained in the [UC Davis Laboratory Safety Manual](http://safetyservices.ucdavis.edu/article/laboratory-safety-manual), [campus Emergency Response Guide (ERG)](http://safetyservices.ucdavis.edu/sites/default/files/documents/Emergency_Response_Guide.pdf), and [UCD Health System ERG](http://www.ucdmc.ucdavis.edu/medresearch/downloads/labsafety/2.6-UCDHS-Emergency-Response-Guide.pdf). The applicable ERG must be posted in the laboratory. All other locations must describe detailed emergency procedure instructions below.

* Ethanol and Isopropanol are extremely flammable. Use caution in spill cleanup to not ignite.
* Disinfectants discussed above release fumes. These fumes can be an irritant and in some cases a toxic gas. Know what you are doing before cleaning up a spill and consider if you need to call for outside help. Please consult the SDS for your chemical solution to find the best practices for emergency procedures and spill clean-up.
1. **WASTE MANAGEMENT AND DECONTAMINATION**

Hazardous waste must be managed according to [Safety Net #8](http://safetyservices.ucdavis.edu/safetynet/guidelines-disposal-chemical-waste), and must be [properly labeled](http://safetyservices.ucdavis.edu/article/hazardous-waste-storage-and-labeling). In general, hazardous waste must be removed from your laboratory within 9 months of the accumulation start date; refer to the [accumulation time for waste disposal to ensure compliance](http://safetyservices.ucdavis.edu/article/hazardous-waste-storage-and-labeling). Hazardous waste pick up requests must be completed using [WASTe](https://ehs.ucop.edu/waste/#/).

 **\***See the [WASTe Factsheet](https://ucdavis.app.box.com/s/dgpovz3l71h3mtd4zegq0ago708q4sc5) for instructions on how to complete a label.

For the disinfectants discussed above, there is not likely to be a waste stream generated. Storage of disinfectants should follow the directions on the label.

Upon completion of work with hazardous chemicals and/or decontamination of equipment, remove gloves and/or PPE properly and wash hands and arms with soap and water. Additionally, upon leaving a designated hazardous chemical work area, remove all PPE worn and wash hands, forearms, face, and neck as needed. Face masks/coverings may be an exception to these rules. Contaminated clothing or PPE should not be worn outside the lab. Soiled lab coats should be sent for professional laundering. Grossly contaminated clothing/PPE must not be reused. Disposable gloves must not be reused.

1. **DESIGNATED AREA**

*Describe areas to be disinfected, all work areas should be considered, including laboratory space, equipment rooms, greenhouses, fields, processing facility, university vehicle, etc.*

*Provide a description of the areas with schedules and descriptions of who will perform the disinfection.*

*Within these designated areas and in planning work it may also be necessary to consider: the size of the area, how many people can work and maintain social distancing in the space, can shift work minimize risk, can equipment be moved to improve safety, and does airflow need to be considered (e.g. air flow within the lab from doors to a fume hood).*

1. **DISINFECTION PROTOCOL**

*General description of the work being performed in the space, including considerations for any specialized tasks (e.g. lab specific SOPs)*

*How scheduling/approval for work is obtained for the designated space (consider if PI is unavailable or sick)*

*Procedure for communicating events that have occurred (i.e. call/email/text upon arrival, disinfection, leaving, etc.).*

*Procedure for cleaning (if needed) & disinfection, what disinfectant to use, how to prepare the disinfectant, how to use the disinfectant with contact times, and PPE to be worn*

*You may also attach detailed laboratory-specific procedures, information on hazardous chemical(s) or hazard class (e.g. SDS), or any other relevant supporting material.*

**TEMPLATE AND LAB-SPECIFIC REVISION HISTORY**

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| --- | --- | --- | --- |
| **Version** | **Date Approved** | **Author** | **Revision Notes:** |
| **1.0** | May 7, 2020 | **C.M. Joseph** | New |
| **2.0** | May 15, 2020    |  | Updated sections 10 and 11. Updated recommendations on bleach |
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### Documentation of Standard Operating Procedure Training

*(Signature of all users is required)*

* Prior to **Working During the Covid-19 Pandemic**, laboratory personnel must be trained on the hazards involved in working with this SOP, how to protect themselves from the hazards, and emergency procedures.
* Ready access to this SOP and to a Safety Data Sheet for each hazardous material described in the SOP must be made available.
* The Principal Investigator (PI), or the Laboratory Supervisor if the activity does not involve a PI, must ensure that their laboratory personnel have attended appropriate laboratory safety training or refresher training within the last three years.
* Training must be repeated following **any** revision to the content of this SOP. Training must be documented. This training sheet is provided as one option; other forms of training documentation (including electronic) are acceptable but records must be accessible and immediately available upon request.

**Designated Trainer: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_**

name  signature     initials

I have read and acknowledge the contents, requirements, and responsibilities outlined in this SOP and **I have demonstrated handwashing, face mask, and glove removal correctly**:

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| --- | --- | --- | --- |
| **Name** | **Signature** | **Trainer Initials** | **Date** |
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