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| Standard Operating Procedure for:  **Making and using aqua regia** | PPE required: |
| Aqua regia is a highly corrosive mixture of acids (usually 1:3 concentrated nitric acid and hydrochloric acid). It is a fuming yellow or red solution commonly used to remove minor organic contaminants from glass. Upon mixing of the acids toxic chlorine and nitrosyl chloride gas is produced so all handling and storage must be carried out in a fume cupboard. **Always handle with sash of an uncluttered fume cupboard between you and the solution. Wear lab safety glasses, lab coat and nitrile gloves and long cuffed chemical resistant gloves.** You must also have spill kit including sodium (bi)carbonate available to mop up and neutralise spillages.  **This activity requires training.** |
| **Making aqua regia**  Always use glass (preferably Pyrex) containers. Aqua regia will melt some plastics and corrode/dissolve most metals. **Never carry out this activity alone**.   1. **Make sure glass beaker for aqua regia is clean and dry. Label beaker “**Aqua Regia, Extremely Corrosive!” 2. Wearing appropriate PPE and in a fume cupboard (see above) (with appropriate spill kit) pour the appropriate amount of HCl into the beaker – **no more than half full**. 3. **Slowly** add the appropriate amount of concentrated nitric acid 4. Place a watch glass onto of the container. NEVER SEAL CONTAINER. 5. **Carefully** push covered beaker to back of fume cupboard and leave for 10mins to finish initial reactions. **Clean up any drips.**   **Adding glassware to aqua regia**  Only add glassware (preferably Pyrex). Aqua regia will melt some plastics and corrode/dissolve most metals.   1. Rinse the items you wish to clean with DI water. **If large amounts of organic material remain ensure they are removed as can cause explosion**. 2. Make sure you are wearing appropriate PPE (and with appropriate spill kit). 3. Carefully slide glass beaker to front of fume cupboard and remove lid. Be careful to avoid drips which should be cleaned up straight away with a tissue. 4. Carefully place items into aqua regia being careful not to break glass or splash acid. 5. Carefully return lid and carefully slide beaker to back of fume cupboard. 6. Leave for appropriate length of time. **Clean up any drips.**   **Removing items from aqua regia**   1. Prepare a container of deionised water big enough to hold items to be removed. 2. Make sure you are wearing appropriate PPE (see above) take particular caution over the top of the gloves and sleeves – tuck lab coat into gloves to avoid dipping sleeves. 3. Carefully slide glass beaker to front of fume cupboard and remove lid being careful to avoid drips (see spillage procedure). 4. Carefully remove items and place in to the container of deionised water. 5. Carefully return lid and slide aqua regia to back of fume cupboard. **Clean up any drips.** 6. Take container of dionized water to sink and carefully rinse items 3-5 times. | Hazard symbols:    Oxidising |
| Significant hazards:  **Concentrated hydrochloric and nitric acid.** |
| Hazard phrases (H):  **H272**  **H314**  **H335** |
| Can it be done out of hours?  **Glassware can be left in aqua regia beaker out-of-hours but aqua regia should not be handled out-of-hours.** |
| **This SOP is not relevant in the following circumstances:**   1. Contents of acid bath or glassware are radioactive or biocontaminated. 2. Any others situation where the procedure may result in harm to yourself or others. | |

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| Standard Operating Procedure for:  **Spillage and disposal of aqua regia** | PPE required: |
| Aqua regia is a highly corrosive mixture of acids (usually 1:3 concentrated nitric acid and hydrochloric acid). It is a fuming yellow or red solution commonly used to remove minor organic contaminants from glass. Upon mixing of the acids toxic chlorine and nitrosyl chloride gas is produced so all handling and storage must be carried out in a fume cupboard. **Always handle with sash of an uncluttered fume cupboard between you and the solution. Wear lab safety glasses, lab coat and nitrile gloves and long cuffed chemical resistant gloves.** You must also have spill kit including sodium (bi)carbonate available to mop up and neutralise spillages.  **This activity requires training.** |
| **Dealing with spillage**  Never deal with aqua regia spillages alone. In case of a major spill (>200ml) consider evacuating the laboratory. Do not attempt to clean up. Contact an emergency contact.  In case of a minor spillage (<200ml) deal with only if you feel comfortable otherwise contact a technician.   1. Ensure you are wearing appropriate PPE and make use of spill kits available. 2. Spread dry sodium (bi)carbonate liberally over the spillage and cautiously mop up with water. Use an absorbent sock to prevent spillage spreading if necessary. 3. Mop up neutralized spillage with absorbent pad from spill and carefully transfer to orange bag for disposal.   **In an emergency contact one of the following personnel:**   |  |  |  | | --- | --- | --- | | Andy Connelly | 30166 | 07850190627 | | David Banks | 35244 / 31647 | | | Sarah Burdall | 38042 | 0750 6707339 | | Jerry Lee | 345245 | 07789271418 | | Health and Safety services | | 34201 |   **First aid**  If you have any exposure of aqua regia make sure you inform a technician.  **Inhalation:** Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.  **Ingestion:** DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.  **Skin Contact:** In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.  **Eye Contact:** Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.  **Disposal of aqua regia**  Once you have finished using the aqua regia it can be disposed of:   1. Make sure you are wearing appropriate PPE (see above) 2. In the fume cupboard very carefully pour the aqua regia into an acid resistant plastic container using a funnel. Only fill container 70% to reduce change of spillage. 3. DO NOT TIGHTEN LID OF CONTAINER. 4. Wipe clean and label the container clearly and store in a ventilated cabinet. 5. Clean up any drips or spillages. | Hazard symbols:    Oxidising |
| Significant hazards:  **Concentrated acids**  **Toxic gases** |
| Hazard phrases (H):  **H272**  **H314**  **H335** |
| Can it be done out of hours?  **Glassware can be left in aqua regia beaker out-of-hours but aqua regia should not be handled out-of-hours.** |
| **This SOP is not relevant in the following circumstances:**   1. Contents of acid bath or glassware are radioactive or biocontaminated. 2. Any others situation where the procedure may result in harm to yourself or others. | |