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**SSERC Risk Assessment** (revised version March 2018)

(based on HSE’s INDG 163 ‘Risk assessment - A brief guide to controlling risks in the workplace’)

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| Activity assessed | Cobalt complexes |
| *Date of assessment* | 03/12/2019 |
| *Date of review (****Step 5****)* |  |
| *School* |  |
| *Department* |  |

| Step 1 | Step 2 | Step 3 | Step 4 | | |
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| *List Significant hazards here:* | *Who might be harmed and how?* | *What are you already doing?*  *What further action is needed?* | *Actions* | | |
| *by whom?* | *Due date* | *Done* |
| **Synthesis of hexaammino cobalt III complex** | | | | | |
| Ammonia is corrosive and toxic by inhalation | Technician (or teacher) decanting solution.  Demonstrator by splashing. Both by inhalation. | Wear goggles (BS EN 1663 (and gloves). Work in a fume cupboard |  |  |  |
| Cobalt chloride is harmful is swallowed, a skin/respiratory sensitiser, a mutagen, carcinogen and reproductive toxin. | Technician (or teacher) preparing solution and student carrying it out – by inhalation | Most of the hazards are only significant if the cobalt chloride is inhaled. Work in a well-ventilated room and keep boiling to a minimum to reduce aerosol formation. Wear eye protection and consider wearing gloves. |  |  |  |
| Concentrated hydrochloric acid is corrosive and produces corrosive fumes.  The solution is a skin/eye irritant. | Technician (or teacher) preparing solution | Wear goggles (BS EN 166 3) and gloves. Work in a well-ventilated room or, if the quantity is more than a few cm3, use a fume cupboard.  Wear eye protection when handling the solution. |  |  |  |
| **Titration of hexaammino cobalt III complex** | | | | | |
| Sodium hydroxide is corrosive to skin and eyes  4 mol l-1 sodium hydroxide is also corrosive | Technician while preparing or teacher/pupils while using solution by splashes | Wear goggles (BS EN 166 3) and gloves. |  |  |  |
| Boiling the solution produces ammonia which is corrosive and toxic by inhalation | Teacher or pupils by inhalation of fumes | Work in a well-ventilated room or use a fume cupboard. |  |  |  |
| Concentrated hydrochloric acid is corrosive and produces corrosive fumes. | Teacher or pupil carrying out experiment by splashes or inhalation | Wear goggles (EN 166 3) and gloves. Work in a well-ventilated room or, if the quantity is more than a few cm3, use a fume cupboard. |  |  |  |
| Cobalt III oxide is harmful if swallowed a skin sensitiser and possible carcinogen.  Cobalt II compounds are carcinogens by inhalation | Teacher or pupil carrying out experiment by inhalation. | Cover the container while boiling and/or work in a fume cupboard. |  |  |  |
| **Synthesis of** **dichloro-bis-(1,2-diaminoethane) cobalt (III) chloride isomers** | | | | | |
| Cobalt chloride is harmful is swallowed, a skin/respiratory sensitiser, a mutagen, carcinogen and reproductive toxin. | Technician, teacher or pupil, preparing solution– by inhalation. | Most of the hazards are only significant if the cobalt chloride is inhaled. Work in a well-ventilated room. Wear eye protection and consider gloves. |  |  |  |
| 1,2-diaminoethane is flammable, harmful if swallowed or in contact with skin, Corrosive to skin and eyes and a skin sensitiser | Technician preparing 10% solution.  Pupil carrying out reaction by spillage or fire | Handle in a fume cupboard.  Keep away from sources of ignition.  Wear goggles (EN 166 3) and gloves. |  |  |  |
| Concentrated hydrochloric acid is corrosive and produces corrosive fumes. | Teacher or pupil carrying out experiment by splashes or inhalation | Wear goggles (EN 166 3) and gloves. Work in a well-ventilated room or, if the quantity is more than a few cm3, use a fume cupboard. |  |  |  |
| Ethanol is highly flammable. A 50% solution is still flammable. | Pupil while washing or recrystallizing from ethanol | Keep away from sources of ignition. |  |  |  |
| PET ethers are highly flammable | Pupil while washing with PET ether | Keep away from sources of ignition. |  |  |  |

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| **Description of activity:**  A hexaammino cobalt III complex is formed and then analysed by titration.  Cis and Trans isomers of dichloro-bis-(1,2-diaminoethane) cobalt (III) are also synthesised |

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| **Additional comments:**  The complexes are not well characterized but it is best to assume they have similar hazards to other cobalt compounds. Be particularly cautious of raising dust or aerosols that can be inmhaled. |