**LAB TECHNICIAN NOTES SCHOOL:**

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| **EXPERIMENT 4.1A: Direct synthesis with a ‘pop’** |

*Risks should be managed by use of PPE and/or appropriate control measures*

Description of procedure (attach a copy of the experiment)

**Oxford Science 10:** pages 90–91 and 200

**Equipment required**

|  |
| --- |
| Each group requires:  Magnesium ribbon 3 strips of 1cm in length, 10ml of 1M hydrochloric acid, 2 test tubes and test tube rack, rubber stopper to fit test tube, wooden splint, matches |

**Recipe**

| Chemical/solution | Formula | Mol. Wt | Procedure |
| --- | --- | --- | --- |
| 1M Hydrochloric acid (liquid) | HCl | 36.46 | Make up in a fume cupboard with all safety equipment on.  32% Hydrochloric acid – in a 1 litre volumetric flask take 100ml of 32% hydrochloric acid and add to 800ml of deionised /distilled water with gentle swirling. Make up to 1 litre with deionised/distilled water.  36% Hydrochloric acid – 86ml of 36% hydrochloric acid to 1 litre of deionised/distilled water. Procedure as for 32% hydrochloric acid.  Always add acid to water never add water to acid as this may cause violent splashes. |

**Hazardous chemicals required/produced**

| Reactant or product name and concentration | GHS classification | GHS hazard statement | Control measures |
| --- | --- | --- | --- |
| Hydrochloric acid  32% - 36%  (concentrate) | **DANGER**  https://jr.chemwatch.net/Resources/Images/GHSCor.GIF  Corrosive  https://jr.chemwatch.net/Resources/Images/GHSTox.GIF  Toxic | H290 - May be corrosive to metals  H330 - Fatal if inhaled  H314 - Causes severe skin burns and eye damage  H335 - May cause respiratory irritation | Acute Toxicity.  Do not breathe vapour and avoid skin contact. May damage eyes.  Wear safety glasses, lab coat, closed in shoes and use in a fume cupboard at all times when preparing dilutions etc.  Always add acid to water never add water to acid as this may cause violent splashes.  IF ON SKIN (or hair): Remove/take off immediately all contaminated clothing. Rinse skin with water/shower  IF INHALED: remove person to fresh air keep at rest in a position comfortable for breathing.  IF IN EYES: Rinse eyes carefully with water for several minutes. Remove contact lenses if able to without causing distress. Continue rinsing.  If SWALLOWED: Rinse mouth. Do not induce vomiting.  Seek medical attention if required. |
| Magnesium ribbon | **DANGER**  https://jr.chemwatch.net/Resources/Images/GHSFla.GIF  Flammable | H228 – Flammable solid  H261 – In contact with water releases flammable gas (which may ignite spontaneously) | Keep away from ignition sources  Use magnesium ribbon only as described in this practical. Dangerous if instructions are not followed. Magnesium reacts violently with a number of other substances.  Refer to Safety Data Sheet.  Wear gloves, lab coat and safety glasses.  If skin contact is made wash off with soap and water.  If magnesium comes in contact with eyes flush eyes with fresh running water. If pain or irritation persists seek medical attention. |
| Box of Matches | **WARNING**  C:\Users\temp\Dropbox\GHSFla[1].gif  Flammable | H228 – Flammable solid | Keep the box of matches away from flames, heat, hot surfaces and sparks.  To safely light a match use a light downward stroke on the striking surface, away from the body, protected from wind.  Wear safety glasses to protect the eyes from matches splintering while being ignited. |

NON-HAZARDOUS substances

|  |  |  |  |
| --- | --- | --- | --- |
| 1M Hydrochloric acid  (liquid) |  | Not classified as Hazardous | Wear safety glasses, lab coat, gloves and closed in shoes when handling.  Diluted acid may cause burns and eye damage. Avoid inhalation of vapours. Use in a well ventilated room. |

Other hazards and possible risks

|  |
| --- |
| Test tubes may break and cause cuts. Sweep up broken glass with a brush and dustpan, do not use fingers.  Discard any chipped or cracked test tubes to a broken glass bucket.  Wooden splint/taper may have splinters that can embed in skin. The splint/taper is also lit and may cause burns. Ensure the wooden splint/taper is extinguished with water when finished. |

Protective measures

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Lab coat | Safety glasses | Gloves | Fume cupboard | Other |
| Yes | Yes | Yes | Yes | Prepare 1M hydrochloric acid solution in an operating fume cupboard. |

Assessor’s signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\*\*\*\*\***This assessment is not valid until it has been completed and signed by an assessor approved by the school.**

***All technicians are to sign the following statement before conducting this experiment.***

I have read this risk assessment and I understand the safety procedures and risks involved.

|  |  |  |
| --- | --- | --- |
| **Technician’s name** | **Technician’s signature** | **Date** |
|  |  |  |
|  |  |  |

Disposal of waste and lab technician notes

|  |
| --- |
| Supply the class and teacher with a plastic sieve over a large beaker. Pour the metal and acid through the sieve to collect the magnesium metal. Once collected rinse metal, dry and store in a glass jar for waste collection. Hydrochloric acid can be put down the sink followed by water.  Use long matches instead of lighting a taper.  Warn students and teacher that the reaction will make a noise. This may avoid a fright and an accident. |

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| \*\*\*\*NOTES:   * Individual schools have a legal obligation to acquire their own manufacturer’s SDS and produce a risk assessment relevant to their own situation. * This risk assessment sheet is provided for your guidance only. * Disposal of waste is subject to the laws and regulations of states, territories and local authorities. * It is not to be assumed that products bought from supermarkets are non-hazardous.   DISCLAIMER:  These guidelines are designed to serve as a general reference only. It does not replace the school’s legal obligation to provide a valid risk assessment to ensure the safety of the staff and students conducting this experiment. While the Publisher has endeavoured to ensure that the material provided is free from error, the Publisher does not warrant the accuracy, adequacy or completeness of that material or that the material is suitable for your intended use. To the fullest extent permitted by law the Publisher disclaims all responsibility for any actions taken or not taken in relation to the material provided. |

**LAB TECHNICIAN NOTES SCHOOL:**

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| **EXPERIMENT 4.1B: Decomposing a carbonate** |

*Risks should be managed by use of PPE and/or appropriate control measures*

Description of procedure (attach a copy of the experiment)

**Oxford Science 10:** pages 90–91 and 201

**Equipment required**

|  |
| --- |
| Each group requires:  Small jars (or samples) of copper (ll) carbonate, copper (ll) oxide and calcium carbonate (powder)  Pyrex (high strength) test tubes x3 and test tube rack  Test tube holder , Bunsen burner, matches and spatula  Additional equipment for student design may include limewater and a lit splint. |

**Recipes**

| Chemical/solution | Formula | Mol. Wt | Procedure |
| --- | --- | --- | --- |
| Limewater solution  (saturated calcium hydroxide solution) | Ca(OH)2 | 74.1 | Weigh 25g of calcium hydroxide. Add to 1 litre of distilled/deionised water in a bottle with lid. (Schott bottle works well).  Ensure lid is on properly and shake well. Allow to settle. The clear liquid is the saturated solution. Decant the clear liquid into another bottle ready for use. Add more water to the original container to keep the container full as the clear solution is used. Shake and allow to settle. |

**Hazardous chemicals required/produced**

|  |  |  |  |
| --- | --- | --- | --- |
| Reactant or product name and concentration | GHS classification | GHS hazard statement | Control measures |
| Copper (ll) carbonate (solid) | **WARNING**  **C:\Users\temp\Dropbox\GHSHar[1].gif**  Irritant | H302- Harmful if swallowed  H315 – Causes skin irritation  H319 – Causes serious eye irritation  H335 – May cause respiratory irritation | Wear safety glasses, gloves and lab coats when using this substance.  Do not, eat or drink while using this substance.  IF SWALLOWED: rinse mouth with fresh water and seek medical attention without delay.  IF IN EYES: wash immediately with fresh running water. Gently lift eye lids to irrigate occasionally. Seek medical help.  IF ON SKIN: wash off immediately with fresh running water and soap. |
| Copper (ll) oxide (solid) | **WARNING**  C:\Users\temp\Dropbox\th4H7Q6WYY.jpg  C:\Users\temp\Dropbox\GHSEnv[1].gif  Environmentally  hazardous | H302 - Harmful if swallowed  H410 - Very toxic to aquatic life with lasting effects | Wear safety glasses, gloves and lab coats when using this substance.  IF SWALLOWED: rinse mouth and call a poison centre. Seek medical help if unwell.  IF IN EYES: wash immediately with fresh running water. Gently lift eye lids to irrigate occasionally. Seek medical help.  IF ON SKIN: wash off immediately with fresh running water and soap. |
| Calcium carbonate  (solid powder) | **DANGER**  **C:\Users\temp\Dropbox\th4H7Q6WYY.jpg**  **https://jr.chemwatch.net/Resources/Images/GHSCor.GIF**  **Corrosive** | H315 - Causes skin irritation  H318 - Causes serious eye damage  H335 - May cause respiratory irritation | Wear safety glasses, gloves and lab coats.  IF SWALLOWED: rinse mouth and call a poison centre. Seek medical help if unwell.  IF IN EYES wash immediately with fresh running water. Gently lift eye lids to irrigate occasionally. Seek medical help.  IF ON SKIN: wash off immediately with fresh running water and soap. |
| Box of Matches | **WARNING**  **C:\Users\temp\Dropbox\GHSFla[1].gif**  Flammable | H228 – Flammable solid | Keep the box of matches away from flames, heat, hot surfaces and sparks.  To safely light a match use a light downward stroke on the striking surface, away from the body, protected from wind.  Wear safety glasses to protect the eyes from matches splintering while being ignited.  Ensure hair is tied back and loose clothing tucked away. |
| Limewater  (saturated calcium hydroxide) | **DANGER**  **https://jr.chemwatch.net/Resources/Images/GHSCor.GIF**  Corrosive | H290 – May be corrosive to metals  H314 – Causes severe skin burns and eye damage  H318 – Causes serious eye damage | Wear gloves, lab coat and safety glasses.  IF ON SKIN: wash off with soap and water.  IF SWALLOWED: rinse mouth with fresh water do not induce vomiting.  IF IN EYES: flush eyes with fresh running water for several minutes. Remove contact lenses if present and easy to do. Seek medical attention. |

Other hazards and possible risks

|  |
| --- |
| Bunsen burners may be hot. Allow to cool before putting away. Check hoses to Bunsen burners show no sign of wear or holes. Replace if they do. If burnt, run burn under cold water for 15 minutes at least. Seek medical attention if pain persists.  Test tubes may break and cause cuts. Sweep up broken glass with a brush and dustpan, do not use fingers.  Discard any chipped or cracked test tubes to a broken glass bucket. |

Protective measures

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Lab coat | Safety glasses | Gloves | Fume cupboard | Other |
| Yes | Yes | Yes |  |  |

Assessor’s signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\*\*\*\*\***This assessment is not valid until it has been completed and signed by an assessor approved by the school.**

***All technicians are to sign the following statement before conducting this experiment.***

I have read this risk assessment and I understand the safety procedures and risks involved.

|  |  |  |
| --- | --- | --- |
| **Technician’s name** | **Technician’s signature** | **Date** |
|  |  |  |
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Disposal of waste and lab technician notes

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| --- |
| All powders that have been heated should be collected into separate labelled waste containers for waste disposal collection.  Try to give the students spatula’s that will go into the test tube or, alternatively supply small powder funnels so the powder goes into the test tube. The powder tends to go everywhere if the students haven’t got the appropriate equipment. |

|  |
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| \*\*\*\*NOTES:   * Individual schools have a legal obligation to acquire their own manufacturer’s SDS and produce a risk assessment relevant to their own situation. * This risk assessment sheet is provided for your guidance only. * Disposal of waste is subject to the laws and regulations of states, territories and local authorities. * It is not to be assumed that products bought from supermarkets are non-hazardous.   DISCLAIMER:  These guidelines are designed to serve as a general reference only. It does not replace the school’s legal obligation to provide a valid risk assessment to ensure the safety of the staff and students conducting this experiment. While the Publisher has endeavoured to ensure that the material provided is free from error, the Publisher does not warrant the accuracy, adequacy or completeness of that material or that the material is suitable for your intended use. To the fullest extent permitted by law the Publisher disclaims all responsibility for any actions taken or not taken in relation to the material provided. |

**LAB TECHNICIAN NOTES SCHOOL:**

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| **EXPERIMENT 4.1C: Electrolysis** |

*Risks should be managed by use of PPE and/or appropriate control measures*

Description of procedure (attach a copy of the experiment)

**Oxford Science 10:** pages 90–91 and 202

**Equipment required**

|  |
| --- |
| Each group requires:  Copper (ll) sulfate (solid) x 1 spatula, 100ml beaker, stirring rod, spatula, DC power supply,12 V globe and globe holder, wires with alligator clips, 2 carbon rods |

**Recipes**

| Chemical/solution | Formula | Mol. Wt | Procedure |
| --- | --- | --- | --- |
|  |  |  |  |

**Hazardous chemicals required/produced**

| Reactant or product name and concentration | GHS classification | GHS hazard statement | Control measures |
| --- | --- | --- | --- |
| Copper (II) sulfate  (solid) | **WARNING**  https://jr.chemwatch.net/Resources/Images/GHSHar.GIF  Irritant  https://jr.chemwatch.net/Resources/Images/GHSEnv.GIF  Environmentally damaging | H302 - Harmful if swallowed  H315 – Causes skin irritation  H319 – Causes serious eye irritation  H400 – Very toxic to aquatic life  H410 – Very toxic to aquatic life with long lasting effects | Do not eat or drink in the lab.  IF ON SKIN: wash any splashes or solid off skin immediately. Wear gloves.  IF IN EYES: rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  DO NOT put copper (II) sulfate solid or solution down the sink. Copper (II) sulfate is a hazard to the environment, particularly to aquatic/marine animals. Collect and put in a labelled waste container to recycle, reuse or store for waste collection. |

| Reactant or product name and concentration | GHS classification | GHS hazard statement | Control measures |
| --- | --- | --- | --- |
| Copper sulfate  (solution) | https://jr.chemwatch.net/Resources/Images/GHSEnv.GIF  **Environmentally damaging** | H411 – Toxic to aquatic life with long lasting effects | Wear gloves, safety glasses and lab coat.  IF ON SKIN: wash off immediately.  IF IN EYES: rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  DO NOT put copper (II) sulfate solid or solution down the sink. Copper (II) sulfate is a hazard to the environment, particularly to aquatic/marine animals. Collect and put in a labelled waste container to recycle, reuse or store for waste collection. |

Other hazards and possible risks

|  |
| --- |
| Power supply boxes are plugged into mains electricity. There is the possibility of an electric shock. Ensure electrical equipment has current tag, safe and operated correctly. Check cords regularly and replace if any signs of damage.  Glass beakers, and glass stirring rods may break and cause cuts. Sweep up broken glass with a brush and dustpan, do not use fingers. Discard any chipped or cracked beakers to a broken glass bucket.  12V light globes can become hot during use with the possibility of causing burns if touched. They are fragile and the glass may break if not handled carefully while replacing globe or tightening. Ensure globe is cool before touching. There is a possibility of skin or eye damage. Ensure safety glasses are worn. |

Protective measures

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Lab coat | Safety glasses | Gloves | Fume cupboard | Other |
| Yes | Yes | Yes |  |  |
|  | | | | |

Assessor’s signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\*\*\*\*\***This assessment is not valid until it has been completed and signed by an assessor approved by the school.**

***All technicians are to sign the following statement before conducting this experiment.***

I have read this risk assessment and I understand the safety procedures and risks involved.

|  |  |  |
| --- | --- | --- |
| **Technician’s name** | **Technician’s signature** | **Date** |
|  |  |  |
|  |  |  |

Disposal of waste and lab technician notes

|  |
| --- |
| DO NOT put copper (II) sulfate solid or solution down the sink. Copper (II) sulfate is a hazard to the environment, particularly to aquatic/marine animals. Collect and put in a labelled waste container to recycle, reuse or store for waste collection. |

|  |
| --- |
| \*\*\*\*NOTES:   * Individual schools have a legal obligation to acquire their own manufacturer’s SDS and produce a risk assessment relevant to their own situation. * This risk assessment sheet is provided for your guidance only. * Disposal of waste is subject to the laws and regulations of states, territories and local authorities. * It is not to be assumed that products bought from supermarkets are non-hazardous.   DISCLAIMER:  These guidelines are designed to serve as a general reference only. It does not replace the school’s legal obligation to provide a valid risk assessment to ensure the safety of the staff and students conducting this experiment. While the Publisher has endeavoured to ensure that the material provided is free from error, the Publisher does not warrant the accuracy, adequacy or completeness of that material or that the material is suitable for your intended use. To the fullest extent permitted by law the Publisher disclaims all responsibility for any actions taken or not taken in relation to the material provided. |

**LAB TECHNICIAN NOTES SCHOOL:**

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| **EXPERIMENT 4.2: Acid titrations** |

*Risks should be managed by use of PPE and/or appropriate control measures*

Description of procedure (attach a copy of the experiment)

**Oxford Science 10:** pages 92–93 and 203

**Equipment required**

|  |
| --- |
| Each group requires:  Dropper bottles containing:  0.1M Hydrochloric acid, 1M hydrochloric acid, 0.1M ethanoic acid, 1M ethanoic acid, 0.1M sodium hydroxide  Universal indicator solution and pH universal indicator colour chart  Small pieces of magnesium ribbon, 4 test tubes and rack, matches, dropping pipette if not using dropping bottles |

**Recipes**

| Chemical/solution | Formula | Mol. Wt | Procedure |
| --- | --- | --- | --- |
| **0.1M Hydrochloric acid** (liquid) | HCl | 36.46 | Make up in a fume cupboard with all safety equipment on.  To make 1 litre:  32% Hydrochloric acid – in a 1 litre volumetric flask take 10ml of 32% hydrochloric acid and add to 800ml of deionised /distilled water with gentle swirling. Make up to 1 litre with deionised/distilled water.  36% Hydrochloric acid – 8.6ml of 36% hydrochloric acid to 1 litre of deionised/distilled water. Procedure as for 32% hydrochloric acid.  Always add acid to water, never add water to acid as this may cause violent splashes. |
| **1M Hydrochloric acid** (liquid) | HCl | 36.46 | Make up in a fume cupboard with all safety equipment on.  To make 1 litre:  32% Hydrochloric acid – in a 1 litre volumetric flask take 100ml of 32% hydrochloric acid and add to 800ml of deionised /distilled water with gentle swirling. Make up to 1 litre with deionised/distilled water.  36% Hydrochloric acid – 86ml of 36% hydrochloric acid to 1 litre of deionised/distilled water. Procedure as for 32% hydrochloric acid.  Always add acid to water, never add water to acid as this may cause violent splashes. |
| **0.1M Sodium hydroxide solution**  (liquid) | NaOH | 40.00 | Make up in a fume cupboard or a well ventilated room with all safety equipment on.  To make 1 litre:  Weigh 4 g of sodium hydroxide into a weighing dish or small beaker. Place a 1 litre flask or beaker containing 750ml of distilled/deionised water and a magnetic flea on a magnetic stirrer. Add the sodium hydroxide a little at a time with mixing until dissolved. Make up to 1 litre with distilled/deionised water. |
| **0.1M Ethanoic acid** (glacial acetic acid)  (liquid) | CH3COOH | 60.05 | Make up in a fume cupboard with all safety equipment on.  To make 1 litre:  Add 5.8ml ethanoic acid (glacial acetic acid) to approximately 700ml of distilled/deionised water. Make up to 1 litre with distilled/deionised water and mix. |
| **1M Ethanoic acid** (glacial acetic acid)  (liquid) | CH3COOH | 60.05 | Make up in a fume cupboard with all safety equipment on.  To make 1 litre:  Dissolve 58ml ethanoic acid (glacial acetic acid) in 700ml of distilled/deionised water. Make up to 1 litre with distilled/deionised water and mix. |

**Hazardous chemicals required/produced**

| Reactant or product name and concentration | GHS classification | GHS hazard statement | Control measures |
| --- | --- | --- | --- |
| **Universal indicator**  **(diluted in ethanol)** | **WARNING**  https://jr.chemwatch.net/Resources/Images/GHSFla.GIF  Flammable | H226 - flammable liquid and vapour | Keep away from heat  Wear safety glasses, gloves and lab coat.  IF IN EYES: rinse with water for several minutes. If irritation persists seek medical advice.  IF ON SKIN: wash off with plenty of water.  IF SWALLOWED: Immediately drink 2 glasses of water. Consult Doctor. |

| Reactant or product name and concentration | GHS classification | GHS hazard statement | Control measures |
| --- | --- | --- | --- |
| **Hydrochloric acid**  **32% - 36%**  **(concentrate)** | **DANGER**  https://jr.chemwatch.net/Resources/Images/GHSTox.GIF  Toxic  https://jr.chemwatch.net/Resources/Images/GHSCor.GIF  Corrosive | H290 - May be corrosive to metals  H330 - Fatal if inhaled  H314 - Causes severe skin burns and eye damage  H335 - May cause respiratory irritation | Acute Toxicity.  Do not breathe vapour and avoid skin contact. May damage eyes.  Wear safety glasses, lab coat, closed in shoes and use in a fume cupboard at all times when preparing dilutions etc.  Always add acid to water, never add water to acid as this may cause violent splashes.  IF ON SKIN (or hair): Remove/take off immediately all contaminated clothing. Rinse skin with water/shower  IF INHALED: remove person to fresh air keep at rest in a position comfortable for breathing.  IF IN EYES: Rinse eyes carefully with water for several minutes. Remove contact lenses if able to without causing distress. Continue rinsing.  If SWALLOWED: Rinse mouth. Do not induce vomiting.  Seek medical attention if required. |
| **Sodium hydroxide**  Solid  (pellets or flakes) | **DANGER**  https://jr.chemwatch.net/Resources/Images/GHSCor.GIF  Corrosive | H290 – May be corrosive to metals  H314 – Causes severe skin burns and eye damage | Do not breathe vapour and avoid skin contact. Extremely corrosive to eyes.  Wear safety glasses, lab coat, closed in shoes and use in a fume cupboard at all times when preparing dilutions etc.  Always add sodium hydroxide to water never add water to sodium hydroxide as this may cause violent splashes.  IF ON SKIN (or hair): Remove/take off immediately all contaminated clothing. Rinse skin with water/shower  IF INHALED: remove person to fresh air keep at rest in a position comfortable for breathing.  IF IN EYES: Rinse eyes carefully with water for several minutes. Remove contact lenses if able to without causing distress. Continue rinsing.  If SWALLOWED: Rinse mouth. Do not induce vomiting. Seek medical attention. |
| **Ethanoic acid**  **(**acetic acid) liquid | **DANGER**  C:\Users\temp\Dropbox\GHSFla[1] - Copy.gif  Flammable  https://jr.chemwatch.net/Resources/Images/GHSCor.GIF  Corrosive | H290 - May be corrosive to metals  H330 - Fatal if inhaled  H314 - Causes severe skin burns and eye damage  H335 - May cause respiratory irritation | Wear safety glasses, lab coat, gloves and closed in shoes when handling.  IF ON SKIN: Rinse skin with water/shower  IF IN EYES: Rinse eyes carefully with water for several minutes. Remove contact lenses if able to without causing distress. Continue rinsing.  IF INHALED: remove person to fresh air keep at rest in a position comfortable for breathing.  If SWALLOWED: Rinse mouth. Do not induce vomiting.  Seek medical attention if required. |
| **Magnesium ribbon** | **DANGER**  https://jr.chemwatch.net/Resources/Images/GHSFla.GIF  Flammable | H228 – Flammable solid  H261 – In contact with water releases flammable gas (which may ignite spontaneously) | Keep away from ignition sources  Use magnesium ribbon only as described in this practical. Dangerous if instructions are not followed. Magnesium reacts violently with a number of other substances.  Refer to Safety Data Sheet.  Wear gloves, lab coat and safety glasses.  IF ON SKIN: wash off with soap and water.  IF IN EYES: flush eyes with fresh running water. If pain or irritation persists seek medical attention. |
| **Box of Matches** | **WARNING**  C:\Users\temp\Dropbox\GHSFla[1].gif  Flammable | H228 – Flammable solid | Keep the box of matches away from flames, heat, hot surfaces and sparks.  To safely light a match use a light downward stroke on the striking surface, away from the body, protected from wind.  Wear safety glasses to protect the eyes from matches splintering while being ignited. |

**NON-HAZARDOUS substances**

|  |  |  |  |
| --- | --- | --- | --- |
| **1M Hydrochloric acid** | Not classified as Hazardous |  | Wear safety glasses, lab coat, gloves and closed in shoes when handling.  Diluted acid may cause burns and eye damage. Avoid inhalation of vapours. Use in a well ventilated room. |
| **0.1M Hydrochloric acid** | Not classified as Hazardous |  | Wear safety glasses, lab coat, gloves and closed in shoes when handling.  Diluted acid may cause burns and eye damage. Avoid inhalation of vapours. Use in a well ventilated room. |
| **1M Ethanoic acid** | Not classified as Hazardous |  | Wear safety glasses, lab coat, gloves and closed in shoes when handling.  Diluted acid may cause burns and eye damage. Avoid inhalation of vapours. Use in a well ventilated room. |
| **0.1M Ethanoic acid** | Not classified as Hazardous |  | Wear safety glasses, lab coat, gloves and closed in shoes when handling.  Diluted acid may cause burns and eye damage. Avoid inhalation of vapours. Use in a well ventilated room. |
| **0.1M Sodium hydroxide** | Not classified as Hazardous | https://jr.chemwatch.net/Resources/Images/GHSHar.GIF  **WARNING** | Wear safety glasses, lab coat, gloves and closed in shoes when handling.  Diluted sodium hydroxide may cause burns and eye damage.  If in eye rinse immediately with plenty of fresh running water. See doctor if pain, irritation or redness persists.  Wash of skin immediately with fresh running water. |

Other hazards and possible risks

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| --- |
| Test tubes may break and cause cuts. Sweep up broken glass with a brush and dustpan, do not use fingers.  Discard any chipped or cracked test tubes to a broken glass bucket. |

Protective measures

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Lab coat | Safety glasses | Gloves | Fume cupboard | Other |
| Yes | Yes | Yes | Yes |  |

Assessor’s signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\*\*\*\*\***This assessment is not valid until it has been completed and signed by an assessor approved by the school.**

***All technicians are to sign the following statement before conducting this experiment.***

I have read this risk assessment and I understand the safety procedures and risks involved.

|  |  |  |
| --- | --- | --- |
| **Technician’s name** | **Technician’s signature** | **Date** |
|  |  |  |
|  |  |  |

Disposal of waste and lab technician notes

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| --- |
| Supply a plastic sieve to the class and a large beaker so solutions containing the magnesium metal can be separated from the hydrochloric acid. Rinse magnesium with water, dry and collect into a container for reuse or waste collection. No metals down the sink. The diluted hydrochloric acid, ethanoic acid, sodium hydroxide and the drops of universal indicator can be put down the sink, followed by water. |

|  |
| --- |
| \*\*\*\*NOTES:   * Individual schools have a legal obligation to acquire their own manufacturer’s SDS and produce a risk assessment relevant to their own situation. * This risk assessment sheet is provided for your guidance only. * Disposal of waste is subject to the laws and regulations of states, territories and local authorities. * It is not to be assumed that products bought from supermarkets are non-hazardous.   DISCLAIMER:  These guidelines are designed to serve as a general reference only. It does not replace the school’s legal obligation to provide a valid risk assessment to ensure the safety of the staff and students conducting this experiment. While the Publisher has endeavoured to ensure that the material provided is free from error, the Publisher does not warrant the accuracy, adequacy or completeness of that material or that the material is suitable for your intended use. To the fullest extent permitted by law the Publisher disclaims all responsibility for any actions taken or not taken in relation to the material provided. |

**LAB TECHNICIAN NOTES SCHOOL:**

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| **EXPERIMENT 4.3: Precipitation reactions** |

*Risks should be managed by use of PPE and/or appropriate control measures*

Description of procedure (attach a copy of the experiment)

**Oxford Science 10:** pages 94–95 and 204

**Equipment required**

|  |
| --- |
| Each group requires:  Plastic sleeve and white A4 paper or prepared laminated tables (see method)  **0.1M of the following solutions:**  Group A: calcium nitrate, copper (ll) nitrate, magnesium nitrate, silver nitrate, copper (ll) sulfate  Group B: sodium chloride, sodium hydroxide, sodium sulfate, sodium carbonate |

**Recipes**

| Chemical/solution | Formula | Mol. Wt | Procedure |
| --- | --- | --- | --- |
| 0.1M Calcium nitrate | Ca(NO3)2. 4H20 | 236.16 | **Wear a lab coat, safety glasses and gloves. Make up in a fume cupboard or well ventilated lab.**  To make 1 litre:  Dissolve 23.6g in approximately 250ml of distilled/deionised water and then make up to 1 litre with distilled/deionised water. |
| 0.1M Copper (ll) nitrate | Cu(NO3)2. 3H20 | 241.6 | **Wear a lab coat, safety glasses and gloves. Make up in a fume cupboard or well ventilated lab.**  To make 1 litre:  Dissolve 24.2g in approximately 250ml of distilled/deionised water and then make up to 1 litre with distilled/deionised water. |
| 0.1M Magnesium nitrate | Mg(NO3)2.6H20 | 256.41 | **Wear a lab coat, safety glasses and gloves. Make up in a fume cupboard or well ventilated lab.**  To make 1 litre:  Dissolve 25.61g in approximately 250ml of distilled/deionised water and then make up to 1 litre with distilled/deionised water. |
| 0.1M Silver nitrate | AgNO3 | 169.87 | **Wear a lab coat, safety glasses and gloves. Make up in a fume cupboard or well ventilated lab.**  To make 1 litre:  Dissolve 16.99g in approximately 250ml of distilled/deionised water and then make up to 1 litre with distilled/deionised water.  Store in a brown bottle.  Commercially made 0.1M silver nitrate can be brought from a chemical supplier.  **CAUTION:** Silver nitrate looks clear when made up but stains black. Hard to remove once it is black. It may also burn skin. Wear gloves. Immediately clean spill, try not to spread. Wash of skin immediately. Reminder all safety gear must be worn. |
| 0.1M Copper (ll) sulfate | CuSO4. 5H2O | 249.68 | **Wear a lab coat, safety glasses and gloves. Make up in a fume cupboard or well ventilated lab.**  To make 1 litre:  Dissolve 24.97g in approximately 400ml of distilled/deionised water and then make up to 1 litre with distilled/deionised water. |
| 0.1M Sodium chloride | NaCl | 58.45 | **Wear a lab coat, safety glasses and gloves. Make up in a fume cupboard or well ventilated lab.**  To make 1 litre:  Dissolve 5.85g in approximately 250ml of distilled/deionised water and then make up to 1 litre with distilled/deionised water. |
| 0.1M Sodium sulfate | Na2SO4 | 142.04 | **Wear a lab coat, safety glasses and gloves. Make up in a fume cupboard or well ventilated lab.**  To make 1 litre:  Dissolve 14.20g in 250ml and then make up to 1 litre with distilled/deionised water. |

**Hazardous chemicals required/produced**

| Reactant or product name and concentration | GHS classification | GHS hazard statement | Control measures |
| --- | --- | --- | --- |
| **Copper (II) sulfate**  **(solid)** | **WARNING**  https://jr.chemwatch.net/Resources/Images/GHSHar.GIF  Irritant  https://jr.chemwatch.net/Resources/Images/GHSEnv.GIF  Environmentally damaging | H302 - Harmful if swallowed  H315 – Causes skin irritation  H319 – Causes serious eye irritation  H400 – Very toxic to aquatic life  H410 – Very toxic to aquatic life with long lasting effects | Do not eat or drink in the lab  Wear gloves.  IF ON SKIN: wash off skin immediately with soap and water.  IF IN EYES: rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  DO NOT put copper (II) sulfate solid or solution down the sink. Copper (II) sulfate is a hazard to the environment, particularly to aquatic/marine animals. Collect and put in a labelled waste container to recycle, reuse or store for waste collection. |
| **Calcium nitrate, hydrate (solid)** | **WARNING**  https://jr.chemwatch.net/Resources/Images/GHSHar.GIF  C:\Users\temp\Dropbox\GHSOxy[1].gif  Oxidising | H272 – may intensify fire, oxidiser  H302 – Harmful if swallowed  H319 – Causes serious eye irritation  H402 – Harmful to aquatic life. | Keep away from heat, flames and sparks.  Wear safety glasses, lab coat, gloves and closed in shoes when handling.  IF ON SKIN: Wash skin with water and soap.  IF IN EYES: Rinse eyes carefully with water for several minutes. Remove contact lenses if able to without causing distress. Continue rinsing.  If SWALLOWED or INHALED: Seek medical advice from doctor or poisons centre without delay. |
| **Copper nitrate, hydrate**  **(solid)** | **DANGER**  https://jr.chemwatch.net/Resources/Images/GHSHar.GIF  Irritant  https://jr.chemwatch.net/Resources/Images/GHSCor.GIF  Corrosive  C:\Users\temp\Dropbox\GHSOxy[1].gif  Oxidising  https://jr.chemwatch.net/Resources/Images/GHSEnv.GIF  Environmentally damaging | H272 – May intensify fire, oxidiser  H290 – May be corrosive to metals  H302 - Harmful if swallowed  H314 – Causes severe skin burns and eye damage  H318 – Causes serious eye damage.  H401 – Toxic to aquatic life | Keep away from heat, flames and sparks.  Wear safety glasses, lab coat, gloves and closed in shoes when handling.  IF ON SKIN: Rinse skin with fresh running water.  IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  IF SWALLOWED: Rinse mouth. Do not induce vomiting.  DO NOT put copper nitrate solid or solution down the sink. Copper nitrate is a hazard to the environment, particularly to aquatic/marine animals.  Collect and put in a labelled waste container to recycle, reuse or store for waste collection. |
| **Magnesium nitrate,**  **Hexahydrate**  **(solid)** | **WARNING**  https://jr.chemwatch.net/Resources/Images/GHSHar.GIF  C:\Users\temp\Dropbox\GHSOxy[1].gif  Oxidising | H272 – May intensify fire  H319 – Causes serious eye irritation  H402 - Harmful to aquatic life | Keep away from heat, flames and sparks.  Wear safety glasses, lab coat, gloves and closed in shoes when handling.  IF ON SKIN: Rinse skin with fresh running water.  IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Seek medical attention immediately.  IF SWALLOWED: Rinse mouth. Do not induce vomiting.  DO NOT put magnesium nitrate solid or solution down the sink. Magnesium nitrate is a hazard to the environment, particularly to aquatic/marine animals.  Collect and put in a labelled waste container to recycle, reuse or store for waste collection. |

**NON-HAZARDOUS substances**

|  |  |  |
| --- | --- | --- |
| **0.1M Calcium**  **nitrate** | Not classified as Hazardous | Wear safety glasses, lab coat, gloves and closed in shoes when handling.  If in eye rinse immediately with plenty of fresh running water.  Seek medical attention if irritation persists.  Wash off skin with running water and soap. |
| **0.1M Copper**  **nitrate** | Not classified as Hazardous | Wear safety glasses, lab coat, gloves and closed in shoes when handling.  If in eye rinse immediately with plenty of fresh running water.  Seek medical attention if irritation persists.  Wash off skin with running water and soap. |
| **0.1M Magnesium nitrate** | Not classified as Hazardous | Wear safety glasses, lab coat, gloves and closed in shoes when handling.  If in eye rinse immediately with plenty of fresh running water.  Wash off skin with running water and soap. |
| **0.1M Silver**  **nitrate** | Not classified as Hazardous | Wear safety glasses, lab coat, gloves and closed in shoes when handling.  If in eye rinse immediately with plenty of fresh running water.  Wash off skin with running water and soap. |
| **0.1M Copper**  **sulfate** | Not classified as Hazardous | Wear safety glasses, lab coat, gloves and closed in shoes when handling.  If in eye rinse immediately with plenty of fresh running water. See doctor if pain, irritation or redness persists.  Wash of skin immediately with fresh running water. |
| **0.1M Sodium chloride** | Not classified as Hazardous | Wear safety glasses, lab coat, gloves and closed in shoes when handling.  If in eye rinse immediately with plenty of fresh running water. See doctor if pain, irritation or redness persists.  Wash of skin immediately with fresh running water. |
| **0.1M Sodium hydroxide** | Not classified as Hazardous | Wear safety glasses, lab coat, gloves and closed in shoes when handling.  If in eye rinse immediately with plenty of fresh running water. See doctor if pain, irritation or redness persists.  Wash of skin immediately with fresh running water. |
| **0.1M Sodium sulfate** | Not classified as Hazardous | Wear safety glasses, lab coat, gloves and closed in shoes when handling.  If in eye rinse immediately with plenty of fresh running water. See doctor if pain, irritation or redness persists.  Wash of skin immediately with fresh running water. |
| **0.1M Sodium carbonate** | Not classified as Hazardous | Wear safety glasses, lab coat, gloves and closed in shoes when handling.  If in eye rinse immediately with plenty of fresh running water. See doctor if pain, irritation or redness persists.  Wash of skin immediately with fresh running water. |

Other hazards and possible risks

|  |
| --- |
| Glass dropper bottles may break and cause cuts. Sweep up broken glass with a brush and dustpan, do not use fingers.  Discard any chipped or cracked droppers or dropper bottles to a broken glass bucket.  Refer to GHS Material Safety Sheets for instructions of particular chemical, if a spill occurs. |

Protective measures

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Lab coat | Safety glasses | Gloves | Fume cupboard | Other |
| Yes | Yes | Yes | Yes | Make solutions up in a fume cupboard or in a well ventilated lab. |

Assessor’s signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\*\*\*\*\***This assessment is not valid until it has been completed and signed by an assessor approved by the school.**

***All technicians are to sign the following statement before conducting this experiment.***

I have read this risk assessment and I understand the safety procedures and risks involved.

|  |  |  |
| --- | --- | --- |
| **Technician’s name** | **Technician’s signature** | **Date** |
|  |  |  |
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Disposal of waste and lab technician notes

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| --- |
| All drops of chemicals may be washed down the sink as the chemicals are diluted a lot and quantities are very small. Flush with water. If uncertain, check with local water authority.  The experiment method requests a plastic sleeve to put an A4 table in. The students then combine particular drops of chemicals on the plastic sleeve and look for precipitation reactions. Laminating a prepared table works really well. The lab technician could prepare a laminated table for each group, prior to class. Then they can be reused in future classes. Ensure big enough for the drops.  Each group requires two tables one for the experiment and one for writing on. |

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| \*\*\*\*NOTES:   * Individual schools have a legal obligation to acquire their own manufacturer’s SDS and produce a risk assessment relevant to their own situation. * This risk assessment sheet is provided for your guidance only. * Disposal of waste is subject to the laws and regulations of states, territories and local authorities. * It is not to be assumed that products bought from supermarkets are non-hazardous.   DISCLAIMER:  These guidelines are designed to serve as a general reference only. It does not replace the school’s legal obligation to provide a valid risk assessment to ensure the safety of the staff and students conducting this experiment. While the Publisher has endeavoured to ensure that the material provided is free from error, the Publisher does not warrant the accuracy, adequacy or completeness of that material or that the material is suitable for your intended use. To the fullest extent permitted by law the Publisher disclaims all responsibility for any actions taken or not taken in relation to the material provided. |

**LAB TECHNICIAN NOTES SCHOOL:**

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| **EXPERIMENT 4.4: Combustion of wire wool** |

*Risks should be managed by use of PPE and/or appropriate control measures*

Description of procedure (attach a copy of the experiment)

**Oxford Science 10:** pages 96–97 and 205

**Equipment required**

|  |
| --- |
| Each group requires:  Wire wool, 9V battery, crucible, bench mat, scales |

**Hazardous chemicals required/produced**

| Reactant or product name and concentration | GHS classification | GHS hazard statement | Control measures |
| --- | --- | --- | --- |
|  |  |  |  |

Other hazards and possible risks

|  |
| --- |
| Wire wool contains fine wires which may implant in skin. Wear gloves or handle with steel tongs.  Battery 9V: The battery can release heat while connected via a short circuit. This may lead to a rupturing of the battery case. The contents of the battery are corrosive. Batteries if no longer charged should be collected and stored for waste removal. Do not put in the rubbish bin.  Crucibles are fragile and can break if not handled carefully. This may cause cuts. Sweep up broken crucible with a brush and dustpan, do not use fingers. Discard any chipped or cracked crucibles to a broken glass bucket.  Scales or electronic balances that are connected to mains electricity have the possibility of an electric shock if not used properly. Ensure electrical equipment has current tag, safe and operated correctly. Check cords regularly and replace if any signs of damage.  Ensure bench mats are non-flammable. |

Protective measures

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Lab coat | Safety glasses | Gloves | Fume cupboard | Other |
| Yes | Yes | Yes |  | Metal tongs for handling wire wool. |
|  | | | | |

Assessor’s signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\*\*\*\*\***This assessment is not valid until it has been completed and signed by an assessor approved by the school.**

***All technicians are to sign the following statement before conducting this experiment.***

I have read this risk assessment and I understand the safety procedures and risks involved.

|  |  |  |
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| **Technician’s name** | **Technician’s signature** | **Date** |
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Disposal of waste and lab technician notes

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| --- |
| Wire wool once cool can be put in the bin.  Supply spatula’s for moving wire wool if it sticks to the battery when reacting.  Have as many scales or electronic balances set up as possible. There is a lot of weighing, so balances will be in high demand. Ask teacher to supervise the use of the electronic balances. They are delicate instruments and the students may need direction on how to tare an object and place it gently on the pan. |

|  |
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| \*\*\*\*NOTES:   * Individual schools have a legal obligation to acquire their own manufacturer’s SDS and produce a risk assessment relevant to their own situation. * This risk assessment sheet is provided for your guidance only. * Disposal of waste is subject to the laws and regulations of states, territories and local authorities. * It is not to be assumed that products bought from supermarkets are non-hazardous.   DISCLAIMER:  These guidelines are designed to serve as a general reference only. It does not replace the school’s legal obligation to provide a valid risk assessment to ensure the safety of the staff and students conducting this experiment. While the Publisher has endeavoured to ensure that the material provided is free from error, the Publisher does not warrant the accuracy, adequacy or completeness of that material or that the material is suitable for your intended use. To the fullest extent permitted by law the Publisher disclaims all responsibility for any actions taken or not taken in relation to the material provided. |

**LAB TECHNICIAN NOTES SCHOOL:**

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| **EXPERIMENT 4.5: Polymerisation of casein** |

*Risks should be managed by use of PPE and/or appropriate control measures*

Description of procedure (attach a copy of the experiment)

**Oxford Science 10:** pages 98–99 and 206

**Equipment required**

|  |
| --- |
| Each group requires:  100ml full cream milk  5ml ethanoic acid (acetic acid CH3COOH or Vinegar)  Bunsen burner, tripod, gauze mat, thermometer, bench mat, spatula, filter paper, funnel, beaker, conical flask, matches |

**Recipes**

| Chemical/solution | Formula | Mol. Wt | Procedure |
| --- | --- | --- | --- |
|  |  |  |  |

**Hazardous chemicals required/produced**

| **Reactant or product name and concentration** | **GHS classification** | **GHS hazard statement** | **Control measures** |
| --- | --- | --- | --- |
| **Box of Matches** | **WARNING**  C:\Users\temp\Dropbox\GHSFla[1].gif  Flammable | H228 – Flammable solid | Keep the box of matches away from flames, heat, hot surfaces and sparks.  To safely light a match use a light downward stroke on the striking surface, away from the body, protected from wind.  Wear safety glasses to protect eyes from matches splintering while being ignited. |

**NON-HAZARDOUS substances**

|  |  |  |
| --- | --- | --- |
| **Ethanoic acid (Vinegar )** | Not classified as Hazardous | Wear safety glasses, lab coat, gloves and closed in shoes when handling.  If in eye rinse immediately with plenty of fresh running water.  Wash off skin with running water and soap.  Vapour may be irritating. |

Other hazards and possible risks

|  |
| --- |
| **Milk** – ALLERGY ALERT – be aware of milk allergies which could be quite serious. Thorough clean up required to ensure no traces left on benches etc.  Bunsen burners, tripods and gauze mats may be hot. Allow to cool before putting away. Check hoses to Bunsen burners show no sign of wear or holes. Replace if they do.  Run any burns under cold water for 15 minutes at least. Seek medical attention if pain persists.  Glass beakers, flasks, thermometers and funnels may break and cause cuts. Sweep up broken glass with a brush and dustpan, do not use fingers.  Discard any chipped or cracked glassware to a broken glass bucket. |

Protective measures

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Lab coat | Safety glasses | Gloves | Fume cupboard | Other |
| Yes | Yes | Yes |  |  |
|  | | | | |

Assessor’s signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\*\*\*\*\***This assessment is not valid until it has been completed and signed by an assessor approved by the school.**

***All technicians are to sign the following statement before conducting this experiment.***

I have read this risk assessment and I understand the safety procedures and risks involved.

|  |  |  |
| --- | --- | --- |
| **Technician’s name** | **Technician’s signature** | **Date** |
|  |  |  |
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Disposal of waste and lab technician notes

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| --- |
| Casein whey can go down the sink, followed by water and the curd can be bagged and put in the rubbish bin.  Allow Bunsen burners, tripods and gauze mats to cool before putting away. |

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| \*\*\*\*NOTES:   * Individual schools have a legal obligation to acquire their own manufacturer’s SDS and produce a risk assessment relevant to their own situation. * This risk assessment sheet is provided for your guidance only. * Disposal of waste is subject to the laws and regulations of states, territories and local authorities. * It is not to be assumed that products bought from supermarkets are non-hazardous.   DISCLAIMER:  These guidelines are designed to serve as a general reference only. It does not replace the school’s legal obligation to provide a valid risk assessment to ensure the safety of the staff and students conducting this experiment. While the Publisher has endeavoured to ensure that the material provided is free from error, the Publisher does not warrant the accuracy, adequacy or completeness of that material or that the material is suitable for your intended use. To the fullest extent permitted by law the Publisher disclaims all responsibility for any actions taken or not taken in relation to the material provided. |

**LAB TECHNICIAN NOTES SCHOOL:**

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| **EXPERIMENT 4.6A: Effect of temperature on reaction rate** |

*Risks should be managed by use of PPE and/or appropriate control measures*

Description of procedure (attach a copy of the experiment)

**Oxford Science 10:** pages 100–103 and 207

**Equipment required**

|  |
| --- |
| Each group requires:  0.001M potassium permanganate solution 100ml  0.005M oxalic acid solution 100ml  Test tubes, stopwatch, 250ml beaker, 10ml measuring cylinders, thermometer  Class requires: Kettle or access to hot water  Water baths set at specific temperatures. |

**Recipes**

| Chemical/solution | Formula | Mol. Wt | Procedure |
| --- | --- | --- | --- |
| 0.001M potassium permanganate solution | KMnO4  (solid) | 158.03 | To make 1 litre:  Weigh 0.16g of potassium permanganate (solid). In a fume cupboard add the weighed potassium permanganate into 200ml of hot distilled/deionised water in a 250ml beaker. Heat until dissolved on a magnetic hotplate/stirrer (approximately 10 minutes). Allow to cool. Filter through glass wool or fine filter paper, then make up to 1 litre with distilled/deionised water. Store in brown bottles. Will not store for long periods of time. Preferably use as soon as possible. |
| 0.005M oxalic acid solution | C2H2O4.2H2O  (solid) | 126.07 (dehydrate) | To make 1 litre:  Weigh 0.63g of oxalic acid (solid) into 700ml of distilled/deionised water and dissolve. Then make up to 1 litre with distilled/deionised water. Note warnings on SDS. |

**Hazardous chemicals required/produced**

| Reactant or product name and concentration | GHS classification | GHS hazard statement | Control measures |
| --- | --- | --- | --- |
| Potassium permanganate  (solid) | **DANGER**  C:\Users\temp\Dropbox\GHSHar[1].gif  C:\Users\temp\Dropbox\GHSOxy[1].gif  Oxidising  C:\Users\temp\Dropbox\GHSEnv[1].gif  Toxic to aquatic life | H272 - May intensify fire  H302 - Harmful if swallowed  H410 - Very toxic to aquatic life with long lasting effects | Keep away from heat, flames, sparks and combustible materials. If a fire occurs flood with water only. Do not use any other fire extinguisher.  Wear safety glasses, lab coat, gloves and closed in shoes when handling.  IF ON SKIN: Wash skin with water and soap. Seek medical attention if there is still irritation.  IF IN EYES: Rinse eyes carefully with water for several minutes. Get medical attention without delay.  If SWALLOWED or INHALED: Seek medical advice from doctor or poisons centre without delay.  Do not discharge into sewers or waterways. |
| Oxalic acid  (solid) | **DANGER**  C:\Users\temp\Dropbox\GHSHar[1].gif  https://jr.chemwatch.net/Resources/Images/GHSCor.GIF  Corrosive  **C:\Users\temp\Dropbox\Healthhazard_big[1].jpg**  Health hazard | H290 – May be corrosive to metals  H302 – Harmful if swallowed  H312 – Harmful if in contact with skin  H314 - Causes severe skin burns and eye damage  H318 – Causes serious eye damage  H361 – Suspected of damaging fertility or the unborn child | Wear safety glasses, lab coat, gloves and closed in shoes when handling.  Dispense in a fume cupboard. Do not breathe vapours.  IF SWALLOWED: Rinse mouth. Do not induce vomiting.  IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Seek medical attention without delay.  IF ON SKIN: Wash skin with water and soap. Seek medical attention if there is still irritation.  SAFETY ALERT: Note H361 hazard statement. Since this practical has been prepared the Hazard alert has been revised. Please read detailed SDS and make informed decisions for your school. |

NON-HAZARDOUS substances

|  |  |  |  |
| --- | --- | --- | --- |
| 0.001M potassium permanganate  (solution) |  | Not classified as Hazardous | Wear safety glasses, lab coat, gloves and closed in shoes when handling.  Collect waste for waste disposal. |
| 0.005 oxalic acid  (solution) |  | Not classified as Hazardous | Wear safety glasses, lab coat, gloves and closed in shoes when handling.  Collect waste for waste disposal. |
| 0.001M potassium permanganate / 0.005 oxalic acid  (solution) |  | Not classified as Hazardous | Wear safety glasses, lab coat, gloves and closed in shoes when handling.  Collect waste mixture for waste disposal. |

Other hazards and possible risks

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| --- |
| Glass test tubes, thermometers, measuring cylinders and beakers may break and cause cuts. Sweep up broken glass with a brush and dustpan, do not use fingers. Discard any chipped or cracked glassware to a broken glass bucket.  Hot plate: When preparing the permanganate solution it is heated on a hot plate. Possible burn injury if touched when hot. If burnt run under cold water for 15 minutes at least. Seek medical attention if pain persists. Ensure electrical equipment has current tag, safe and operated correctly.  Water baths and Kettle: If an electric water baths and/or kettle is used they are plugged into mains electricity. There is the possibility of an electric shock. Ensure electrical equipment has current tag, safe and operated correctly. Check cords regularly and replace if any signs of damage. |

Protective measures

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Lab coat | Safety glasses | Gloves | Fume cupboard | Other |
| Yes | Yes | Yes | Yes | Use fume cupboard for chemical preparation. |

Assessor’s signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\*\*\*\*\***This assessment is not valid until it has been completed and signed by an assessor approved by the school.**

***All technicians are to sign the following statement before conducting this experiment.***

I have read this risk assessment and I understand the safety procedures and risks involved.

|  |  |  |
| --- | --- | --- |
| **Technician’s name** | **Technician’s signature** | **Date** |
|  |  |  |
|  |  |  |

Disposal of waste and lab technician notes

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| --- |
| Potassium permanganate/ oxalic acid solution must not go down sinks. Students will need to have labelled waste containers in class to put their finished solutions in. Waste to be stored for waste collection.  Large beakers may be used as water baths. Each needs a thermometer and each group needs access to hot water and ice in order to keep water baths at the required temperatures.  Depending on the size of the test tube, 3ml of each chemical (6ml total) is sufficient for each test tube. Test tubes containing the mix of oxalic acid and potassium permanganate react quicker (become clear) at hotter temperatures for example 2 minutes at 65°C and 1 hour for 10°C. Ideal temperatures could be 10°C 30°C 50° and 70°C. Not too many under 40°C as it may take too long to react.  Students need to ensure the potassium permanganate solution and oxalic acid solution sit in the water bath to reach the required temperature prior to being combined and timed. |

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| \*\*\*\*NOTES:   * Individual schools have a legal obligation to acquire their own manufacturer’s SDS and produce a risk assessment relevant to their own situation. * This risk assessment sheet is provided for your guidance only. * Disposal of waste is subject to the laws and regulations of states, territories and local authorities. * It is not to be assumed that products bought from supermarkets are non-hazardous.   DISCLAIMER:  These guidelines are designed to serve as a general reference only. It does not replace the school’s legal obligation to provide a valid risk assessment to ensure the safety of the staff and students conducting this experiment. While the Publisher has endeavoured to ensure that the material provided is free from error, the Publisher does not warrant the accuracy, adequacy or completeness of that material or that the material is suitable for your intended use. To the fullest extent permitted by law the Publisher disclaims all responsibility for any actions taken or not taken in relation to the material provided. |

**LAB TECHNICIAN NOTES SCHOOL:**

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| **EXPERIMENT 4.6B: Factors affecting reaction rate** |

*Risks should be managed by use of PPE and/or appropriate control measures*

Description of procedure (attach a copy of the experiment)

**Oxford Science 10:** pages 100–103 and 208

**Equipment required**

|  |
| --- |
| Each group requires:  30g small marble chips (calcium carbonate) of similar size  20ml of 0.5M hydrochloric acid  20ml of 1.0M hydrochloric acid  20ml of 2.0M hydrochloric acid  Electronic balance, stopwatch, 25ml measuring cylinder, 3 x 100ml conical flasks |

**Recipes**

| Chemical/solution | Formula | Mol. Wt | Procedure |
| --- | --- | --- | --- |
| **0.5M Hydrochloric acid (liquid)** | HCl | 36.46 | Make up in a fume cupboard with all safety equipment on.  Always add acid to water, never add water to acid as this may cause violent splashes  To make 1 litre:  **32% Hydrochloric acid** – in a 1 litre volumetric flask take 50ml of 32% hydrochloric acid and add to 800ml of deionised /distilled water with gentle swirling. Make up to 1 litre with deionised/distilled water.  **36% Hydrochloric acid** – In a 1 litre volumetric flask take 43ml of 36% hydrochloric acid and add to 800ml of deionised/distilled water with gentle swirling. Make up to 1 litre with deionised/distilled water. |
| **1M Hydrochloric acid (liquid)** | HCl | 36.46 | Make up in a fume cupboard with all safety equipment on.  Always add acid to water, never add water to acid as this may cause violent splashes  To make 1 litre:  32% Hydrochloric acid – in a 1 litre volumetric flask take 100ml of 32% hydrochloric acid and add to 800ml of deionised /distilled water with gentle swirling. Make up to 1 litre with deionised/distilled water.  36% Hydrochloric acid – 86ml of 36% hydrochloric acid to 1 litre of deionised/distilled water. Procedure as for 32% hydrochloric acid. | |
| **2M Hydrochloric acid (liquid)** | HCl | 36.46 | Make up in a fume cupboard with all safety equipment on.  Always add acid to water, never add water to acid as this may cause violent splashes.  To make 1 litre:  32% Hydrochloric acid – in a 1 litre volumetric flask take 200ml of 32% hydrochloric acid and add to 800ml of deionised /distilled water with gentle swirling. Make up to 1 litre with deionised/distilled water.  36% Hydrochloric acid – 172ml of 36% hydrochloric acid to 1 litre of deionised/distilled water. Procedure as for 32% hydrochloric acid. | |

**Hazardous chemicals required/produced**

| Reactant or product name and concentration | GHS classification | GHS hazard statement | Control measures |
| --- | --- | --- | --- |
| **Hydrochloric acid**  **32% - 36%**  **(concentrate)** | **DANGER**  https://jr.chemwatch.net/Resources/Images/GHSTox.GIF  Toxic  https://jr.chemwatch.net/Resources/Images/GHSCor.GIF  Corrosive | H290 - May be corrosive to metals  H330 - Fatal if inhaled  H314 - Causes severe skin burns and eye damage  H335 - May cause respiratory irritation | Acute Toxicity.  Do not breathe vapour and avoid skin contact. May damage eyes.  Wear safety glasses, lab coat, closed in shoes and use in a fume cupboard at all times when preparing dilutions etc.  Always add acid to water never add water to acid as this may cause violent splashes.  IF ON SKIN (or hair): Remove/take off immediately all contaminated clothing. Rinse skin with water/shower  IF INHALED: remove person to fresh air keep at rest in a position comfortable for breathing.  IF IN EYES: Rinse eyes carefully with water for several minutes. Remove contact lenses if able to without causing distress. Continue rinsing.  If SWALLOWED: Rinse mouth. Do not induce vomiting.  Seek medical attention if required. |
| **2M Hydrochloric acid** | **WARNING**  https://jr.chemwatch.net/Resources/Images/GHSHar.GIF  https://jr.chemwatch.net/Resources/Images/GHSCor.GIF  Corrosive | H290 - May be corrosive to metals  H330 - Fatal if inhaled  H314 - Causes severe skin burns and eye damage  H335 - May cause respiratory irritation | Wear safety glasses, lab coat, gloves and closed in shoes when handling.  **Diluted acid** may cause burns and eye damage. Avoid inhalation of vapours. Use in a well ventilated room.  IF ON SKIN: Rinse skin with water/shower  IF IN EYES: Rinse eyes carefully with water for several minutes. Remove contact lenses if able to without causing distress. Continue rinsing.  IF INHALED: remove person to fresh air keep at rest in a position comfortable for breathing.  If SWALLOWED: Rinse mouth. Do not induce vomiting.  Seek medical attention if required. |

NON-HAZARDOUS substances

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| --- | --- | --- | --- |
| Marble chips (calcium carbonate)  Solid |  | Not classified as Hazardous | Wear safety glasses, lab coat, gloves and closed in shoes when handling. |
| 0.5M Hydrochloric acid |  | Not classified as Hazardous | Wear safety glasses, lab coat, gloves and closed in shoes when handling.  Diluted acid may cause burns and eye damage. Avoid inhalation of vapours. Use in a well ventilated room. |
| 1M Hydrochloric acid |  | Not classified as Hazardous | Wear safety glasses, lab coat, gloves and closed in shoes when handling.  Diluted acid may cause burns and eye damage. Avoid inhalation of vapours. Use in a well ventilated room. |

Other hazards and possible risks

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| --- |
| Glass measuring cylinders and flasks may break and cause cuts. Sweep up broken glass with a brush and dustpan, do not use fingers. Discard any chipped or cracked glassware to a broken glass bucket.  Have as many electronic balances set up as possible. There is a lot of weighing, so balances will be in high demand. Ensure electrical equipment has current tag, safe and operated correctly. |

Protective measures

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Lab coat | Safety glasses | Gloves | Fume cupboard | Other |
| Yes | Yes | Yes | Yes |  |

Assessor’s signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\*\*\*\*\***This assessment is not valid until it has been completed and signed by an assessor approved by the school.**

***All technicians are to sign the following statement before conducting this experiment.***

I have read this risk assessment and I understand the safety procedures and risks involved.

|  |  |  |
| --- | --- | --- |
| **Technician’s name** | **Technician’s signature** | **Date** |
|  |  |  |
|  |  |  |

Disposal of waste and lab technician notes

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| Supply a plastic sieve to the class and a large beaker so solutions containing the marble chips can be separated from the hydrochloric acid. No marble chips down the sink. Hydrochloric acid can be put down the sink, followed by water.  Rinse used marble chips, dry and reuse for future classes.  The original marble chip container usually has a variety of different sized marble chips in it. Sort through and find similar sized marble chips to give to the students. |

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| \*\*\*\*NOTES:   * Individual schools have a legal obligation to acquire their own manufacturer’s SDS and produce a risk assessment relevant to their own situation. * This risk assessment sheet is provided for your guidance only. * Disposal of waste is subject to the laws and regulations of states, territories and local authorities. * It is not to be assumed that products bought from supermarkets are non-hazardous.   DISCLAIMER:  These guidelines are designed to serve as a general reference only. It does not replace the school’s legal obligation to provide a valid risk assessment to ensure the safety of the staff and students conducting this experiment. While the Publisher has endeavoured to ensure that the material provided is free from error, the Publisher does not warrant the accuracy, adequacy or completeness of that material or that the material is suitable for your intended use. To the fullest extent permitted by law the Publisher disclaims all responsibility for any actions taken or not taken in relation to the material provided. |

**LAB TECHNICIAN NOTES SCHOOL:**

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| **EXPERIMENT 4.7: Using a catalyst** |

*Risks should be managed by use of PPE and/or appropriate control measures*

Description of procedure (attach a copy of the experiment)

**Oxford Science 10:** pages 104–105 and 210

**Equipment required**

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| --- |
| Each group requires:  Hydrogen peroxide (H2O2) 10 volume (vol) solution 2x 5ml  Manganese dioxide (MnO2) powder  Test tubes x 2 and test tube rack  Spatula (small enough to fit inside a test tube) |

**Recipes**

| Chemical/solution | Formula | Mol. Wt | Procedure |
| --- | --- | --- | --- |
| 10vol (3%) Hydrogen peroxide  (liquid) | H2O2 | 34.012 g/mol | Make up in a fume cupboard with all safety equipment on.  If you have a 100vol (30%) hydrogen peroxide, dilute to 10vol (3%) by taking 10ml of 100vol (30%) into 100ml of distilled/deionised water.  3% (10vol) hydrogen peroxide can be purchased ready made from a supermarket or chemical supply company. |

**Hazardous chemicals required/produced**

| Reactant or product name and concentration | GHS classification | GHS hazard statement | Control measures |
| --- | --- | --- | --- |
| **30% (100vol) hydrogen peroxide** (liquid) | **DANGER**  C:\Users\temp\Dropbox\GHSHar[1].gif  C:\Users\temp\Dropbox\GHSCor[1].gif  Corrosive  C:\Users\temp\Dropbox\GHSOxy[1].gif  Oxidising | H272 – may intensify fire; oxidizer  H290 – May be corrosive to metals  H302 – Harmful if swallowed  H332 - Harmful if inhaled  H314 – Causes severe skin burns and eye damage  H318 – Causes serious eye damage | Keep away from heat, flames, hot surfaces and sparks  Do not mix with combustibles or organic material  Do not breathe gas or vapours. Use in a fume cupboard.  Wear gloves.  IF ON SKIN: wash off immediately with cold water.  Wear safety glasses.  IF IN EYES: rinse with clean running water for several minutes. Lift eye lids occasionally to allow complete irrigation. Contact medical advice as soon as possible. Patient will need to be checked by a medical practitioner. |
| **Manganese dioxide (solid)** | **DANGER**  https://jr.chemwatch.net/Resources/Images/GHSHar.GIF  C:\Users\temp\Dropbox\GHSOxy[1].gif  Oxidising  **C:\Users\temp\Dropbox\Healthhazard_big[1].jpg**  Health hazard | H272 – May intensify fire, oxidiser  H303 – Harmful if swallowed  H332 - Harmful if inhaled  H373 - May cause damage to organs through prolonged or repeated exposure | Keep away from heat, flames and sparks.  Wear safety glasses, lab coat, gloves and closed in shoes when handling.  IF ON SKIN: Wash skin with water and soap.  IF IN EYES: Rinse eyes carefully with water for several minutes.  If SWALLOWED: Seek medical advice from doctor without delay.  IF INHALED: Remove to fresh air and rest in a position comfortable for breathing. Seek immediate medical advice.  If powder ignites put out with water. Do not use any other type of extinguisher. | |

NON-HAZARDOUS substances

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| --- | --- | --- | --- |
| **10vol (3%) hydrogen peroxide (liquid)** |  | Not classified as Hazardous | Wear safety glasses, lab coat, gloves and closed in shoes when handling.  Diluted hydrogen peroxide may cause burns and eye damage.  If in eyes rinse with clean running water for several minutes. Lift eye lids occasionally to allow complete irrigation.  Wash off skin with water.  If swallowed do not induce vomiting.  Avoid inhalation of vapours. Use in a well ventilated room. |

Other hazards and possible risks

|  |
| --- |
| Test tubes may break and cause cuts. Sweep up broken glass with a brush and dustpan, do not use fingers.  Discard any chipped or cracked test tubes to a broken glass bucket. |

Protective measures

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Lab coat | Safety glasses | Gloves | Fume cupboard | Other |
| Yes | Yes | Yes | Yes |  |

Assessor’s signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\*\*\*\*\***This assessment is not valid until it has been completed and signed by an assessor approved by the school.**

***All technicians are to sign the following statement before conducting this experiment.***

I have read this risk assessment and I understand the safety procedures and risks involved.

|  |  |  |
| --- | --- | --- |
| **Technician’s name** | **Technician’s signature** | **Date** |
|  |  |  |
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Disposal of waste and lab technician notes

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| Manganese dioxide and hydrogen peroxide mix could be filtered and the waste manganese dioxide residue scraped into a labelled, appropriate sealed waste container to collect for waste disposal. There should be very little waste as small quantities are used. Store in appropriate zone until collected.  Hydrogen peroxide waste can go down the sink followed by running water.  Try to give the students spatula’s that will go into the test tube. The powder tends to go everywhere if the students haven’t got the appropriate equipment. The approximate amount of manganese dioxide required is the amount that fits on the tip of a small spatula. |

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| --- |
| \*\*\*\*NOTES:   * Individual schools have a legal obligation to acquire their own manufacturer’s SDS and produce a risk assessment relevant to their own situation. * This risk assessment sheet is provided for your guidance only. * Disposal of waste is subject to the laws and regulations of states, territories and local authorities. * It is not to be assumed that products bought from supermarkets are non-hazardous.   DISCLAIMER:  These guidelines are designed to serve as a general reference only. It does not replace the school’s legal obligation to provide a valid risk assessment to ensure the safety of the staff and students conducting this experiment. While the Publisher has endeavoured to ensure that the material provided is free from error, the Publisher does not warrant the accuracy, adequacy or completeness of that material or that the material is suitable for your intended use. To the fullest extent permitted by law the Publisher disclaims all responsibility for any actions taken or not taken in relation to the material provided. |