**Student Safety Practical - A**

In the next few lessons you will carry out some test tube reactions to practise your skills. The aim of these experiments is to make sure you know how to be safe at all times. Only if the whole class can complete these activities well will know you are safe enough to be able to complete other practicals throughout the year.

**Section A - Heating Solids Safely**

You have been given some solid samples to heat. One of the solids needs to be heated in a fume cupboard. Record everything you see in your observations neatly in the table below (or if you prefer, you could copy out the table into your exercise book).

**Method**

1. Put one large spatula measure of one of the solids listed below into a test tube.
   * Sand
   * Lithium nitrate
   * Copper sulphate
   * Zinc oxide
   * Copper carbonate
2. Heat gently in a working flame until you see no further change.
3. Record your observations when heating the solids in the table below.
4. Repeat for the other samples.

**Results**

|  |  |  |  |
| --- | --- | --- | --- |
| Solid name | Appearance before heating | Appearance during heating | Appearance upon cooling |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

**Conclusions**

Heating solids

Always use **\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_** to store your test tubes and boiling tubes in when you have finished heating. Select an appropriate holder so that you won’t burn yourself or **\_\_\_\_\_\_\_\_\_\_** the test tube when you are heating it. Select the appropriate flame according to the teacher’s instructions. Either a gentle flame – a **\_\_\_\_\_\_\_\_\_\_** flame or a stronger flame, a **\_\_\_\_\_\_\_\_\_\_** flame. When the solid seems to have finished changing, make sure you stop heating and carefully put it back in the test tube rack to allow it to **\_\_\_\_\_\_\_\_\_\_** down.

**Student Safety Practical - B**

When we heat liquids we use boiling tubes instead of test tubes. Before you complete the practical below your teacher will allow you to set up your apparatus and practise heating distilled water first. Only when both you and your partner are happy that you can control the way the water is boiling should you move onto the step below.

The chemicals you have been given are hazardous. Use the student safety sheets to look up which ones are hazardous:

|  |  |  |  |
| --- | --- | --- | --- |
| Name of reactant | Hazard symbol | Name of product | Hazard symbol |
| Potassium iodide |  | Potassium nitrate |  |
| Lead nitrate |  | Lead iodide |  |

**Section B – Heating Liquids Safely**

1. Using a measuring cylinder, measure out 5cm3 lead nitrate and add to your boiling tube.
2. Using a new measuring cylinder, measure out 5cm3 potassium iodide and add to your boiling tube. Make observations to describe exactly what you can see.
3. Use one of the measuring cylinders to measure out and then add 3cm3 distilled water to the boiling tube.
4. Heat the liquid safely in the boiling tube taking care not to allow any chemical to spit out of the top. Try not to let it boil too much. You are heating to make the solid to dissolve.
5. When the solid has (mostly) dissolved, leave the boiling tube to cool and continue to make observations at regular intervals.

**Results - Observations**

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Heating liquids

After you have carefully measured out the volumes of the liquids that you need and have mixed them in the **\_\_\_\_\_\_\_\_\_\_** tube, carefully set your Bunsen onto a **\_\_\_\_\_\_\_\_\_\_** flame. You need to heat this very gently so you should aim to constantly be moving the boiling tube into and out of the **\_\_\_\_\_\_\_\_\_\_**. If you feel the boiling tube start to **\_\_\_\_\_\_\_\_\_\_** it is about to “bump”. Immediately take the boiling tube out of the flame. When it has settled down, you can continue to heat it. You must always point your boiling tube towards an **\_\_\_\_\_\_\_\_\_\_** part of the room. Try to make sure nothing is ejected out of it – flying boiling liquids can cause a huge amount of damage. [That’s why you should be wearing **\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_** even if you aren’t doing practical!]

**Student Safety Practical - C**

In this practical you will again work with a toxic chemical. This is a very unpleasant chemical indeed. It is not only classed as toxic but it is a category 2 carcinogen. Carcinogenic chemicals are chemicals which can cause \_\_\_\_\_\_\_\_\_\_\_.

It is essential that you use this chemical safely by handling the bottle carefully and ensuring that you do not spill it. If you do spill it you should tell the teacher so that they can clear any mess away.

|  |  |  |  |
| --- | --- | --- | --- |
| Name of reactant | Hazard symbol | Name of reactant | Hazard symbol |
| Sodium or potassium dichromate |  | Dilute sulphuric acid |  |
| Ethanol |  | Product: dilute ethanoic acid |  |

**Section C – Working with toxic chemicals**

**Method**

1. Take any appropriate safety precautions for this reaction.
2. Measure 5cm3 of dilute sulphuric acid in a measuring cylinder and put it into a boiling tube.
3. Add 5 drops of sodium dichromate solution. (Or potassium dichromate).
4. Next add 2 drops of ethanol.
5. Heat the mixture gently until it just starts to boil. You should see a change.
6. Gently keep heating the mixture if you think the change is still ongoing.
7. Write down what you have seen.
8. At the end of the reaction, is there any change of smell?
9. Record your observations in your notes.

**Results**

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**Conclusions**

Using toxic chemicals

Toxic chemicals are toxic for a reason! You must do everything in your power to avoid **\_\_\_\_\_\_\_\_\_\_** these chemicals and if you do, you must tell a **\_\_\_\_\_\_\_\_\_\_** and then very conscientiously help to clear away the **\_\_\_\_\_\_\_\_\_\_** so that none remains. We often wear **\_\_\_\_\_\_\_\_\_\_** if we use toxic chemicals.

**Student Safety Practical - D**

Sometimes we need to heat up flammable chemicals. However because they can easily catch alight, it is better if we can avoid having to heat them with a naked flame. In this example you will make a hot water bath using water boiled in a kettle.

|  |  |  |  |
| --- | --- | --- | --- |
| Name of reactant | Hazard symbol | Name of reactant | Hazard symbol |
| Concentrated ethanoic acid |  | Propanol |  |
| Concentrated sulphuric acid |  | Product: Ester (propyl ethanoate) | Flammable, irritant. |

**Method D – Heating flammable liquids and smelling chemicals safely**

1. Take any appropriate safety precautions for this reaction.
2. Pour some recently boiled water into a medium sized beaker, up to around the 100cm3 level. Leave it to stand
3. Put around 2cm3 propanol into a test tube – this is about one pipette’s worth.
4. Go to the teacher’s bench and add 1cm3 of concentrated ethanoic acid – this is about a half a pipette’s worth.
5. Go to the fume cupboard and carefully add 3 drops of concentrated sulphuric acid to your tube. TAKE CARE!
6. Stand your test tube in the hot water bath for around 5 minutes.
7. While you are waiting, collect a small sized beaker.
8. Fill it about one third full with sodium hydrogen carbonate solution (just past the 25cm3 mark).
9. After the 5 minutes are over, carefully tip the liquid from the test tube into the beaker and stir well.
10. Carefully smell the beaker.

**Results**

What did you see during the experiment?

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Heating flammable liquids

We always use a **\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_** for these and never heat directly with a Bunsen flame because the flammable liquid can accidentally catch **\_\_\_\_\_\_\_\_\_\_** and the glassware could **\_\_\_\_\_\_\_\_\_\_** and hurt you. Be careful of having flammable liquids near **\_\_\_\_\_\_\_\_\_\_** flames. Always put the **\_\_\_\_\_\_\_\_\_\_** back on the bottles for this reason.

**Notes for the future**

**Always wear \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_.**

Sometimes you need to wear **\_\_\_\_\_\_\_\_\_\_** insteadif you are using concentrated acids and alkalis because they are **\_\_\_\_\_\_\_\_\_\_**. You may also need to wear gloves. If you get some dangerous chemical on your gloves you need to **\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_** off and replace them; corrosive chemicals can eat through the glove material!