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| Chemical Investigations |
| Reactions of Metals with Oxygen |
| Teacher/Technician Guide |

A close-up of a drop of water

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Reactions of Metals with Oxygen

*UNIT 3 PPA 3*

**INTRODUCTION**

Some metals, like potassium and sodium, are highly reactive but others, like platinum and gold, are unreactive. The majority of metals however lie between these two extremes.

We can put metals in order of reactivity by comparing their reactions with a variety of chemicals. In this experiment their reactions with oxygen will be compared. Potassium permanganate will be used to provide the oxygen - it does this when it decomposes on heating.

The aim of this experiment is to place zinc, copper and magnesium in order of reactivity by observing the ease with which they react with oxygen.

**Different Metals**

**Each group will need**

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| 3 x dry test tubes | clamp stand and clamp |
| Bunsen burner and heating mat | Mineral / glass wool\* |
| tongs |  |
| samples of  zinc ~ 2 x 0.5 cm strip  copper ~ 2 x 0.5 cm strip and  magnesium ribbon ~ 2 cm | ~5g potassium permanganate |

**Safety**

Wear eye protection.

Potassium manganate VII is a powerful oxidising agent and must not come into direct contact with the metals. Ensure the test tubes are set up appropriately.

Metal powders should not be used in this experiment.

(A safe method can be found on the SSERC website)

\* Some samples of mineral wools and especially Rocksil wool contain oxidisable impurities which can react vigorously with potassium permanganate. Check with the supplier that the wool is free of such impurities. If in doubt, roast the sample beforehand to oxidise the impurities.

**Procedure**

The teacher/lecturer should demonstrate the experiment beforehand using one of the metals – or different one.

1. To a dry test tube add potassium permanganate crystals to a depth of about 1 cm.
2. Place a loose plug of mineral wool immediately above the potassium permanganate crystals.
3. Clamp the test tube at the mouth and in a horizontal position. Make sure that the mouth of the test tube is not pointing at anyone.
4. Add a piece of zinc to the test tube placing it about half-way along the tube. Make sure the zinc is well separated from the potassium permanganate.
5. Heat the contents of the test tube as demonstrated by your teacher/lecturer.
6. Observe the metal as it reacts with oxygen and record your observations.
7. Repeat steps 1 - 6 with copper and then with magnesium. Each time record your observations