

You have been given the following:

- samples of metals
- beaker of dilute sulfuric acid
- pair of scissors
- pipette
- small piece of glass paper
- dimple tile
- plan of the tile.

**Wear goggles during this practical.**

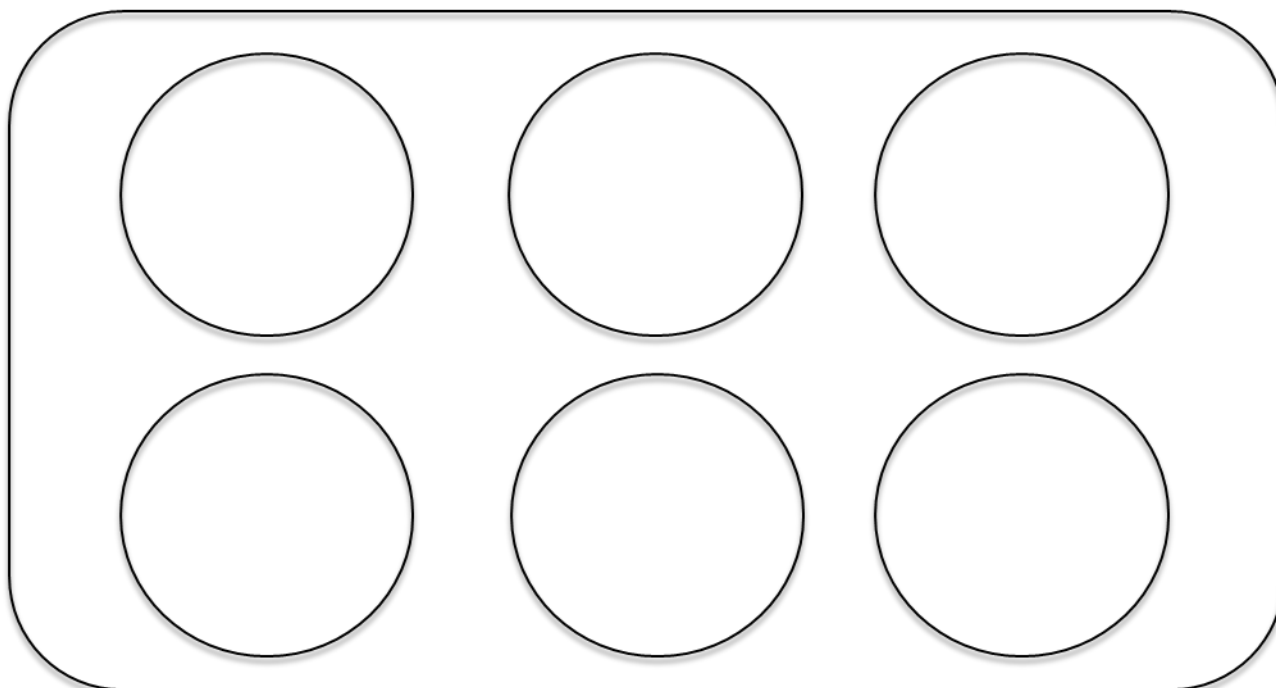
### Instructions

1. Gently rub your piece of copper with the glass paper and cut out approximately a  $0.5 \text{ cm}^2$  of the rubbed metal.
2. Put the square of copper into one of the dimples in the tile and label the correct circle on the plan with the symbol for copper.
3. Repeat this for the other metals, except the aluminium.
4. Cut a  $0.5 \text{ cm}^2$  of the un-rubbed aluminium and place that in the fifth dimple.
5. Use the dropper pipette to add a few drops of the acid to each of the metal samples in turn observing carefully any reaction that occurs.
6. Write your observations for each metal on the plan of the dimple tile.

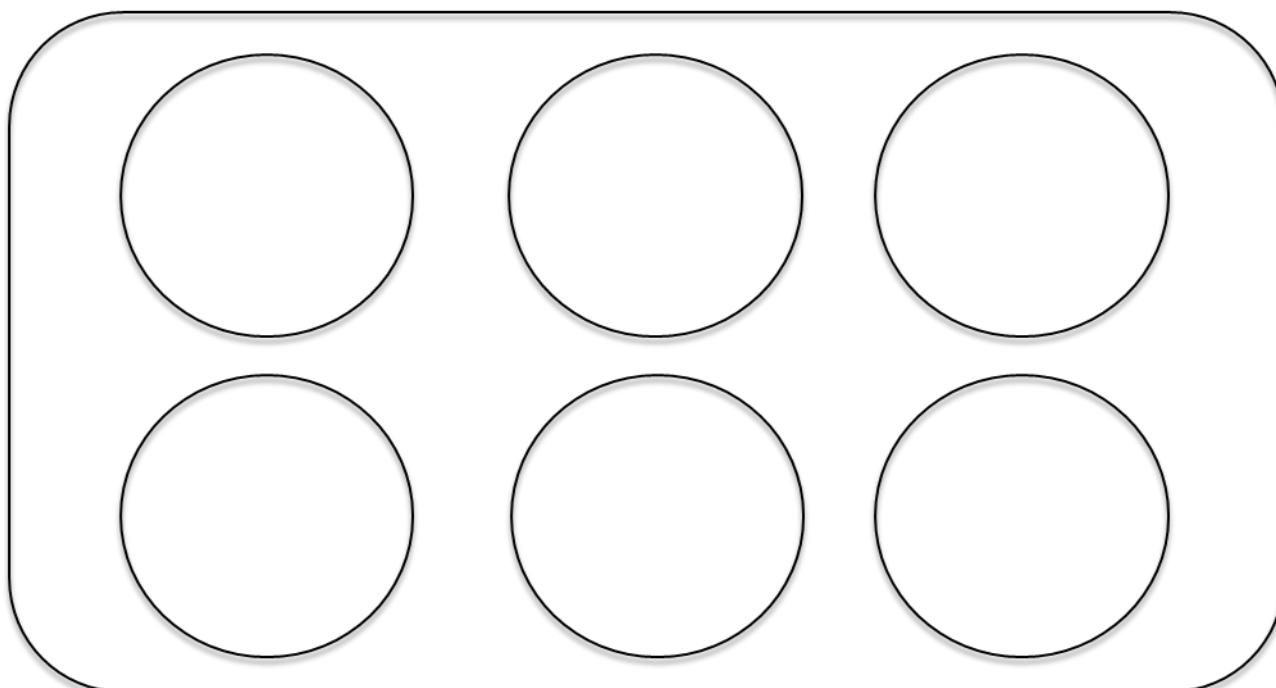
### Questions

1. Why do we wear goggles for this practical?
2. Why did we rub the metal samples with glass paper before adding the acid?
3. Why didn't we rub the aluminium sample? (2 reasons)
4. Did any of the metals react with the acid? If so, which ones and how did you know?
5. Some metals react more vigorously than others; put the metals that reacted in order of their reactivity. How did you decide?
6. When a metal reacts with the acid, which gas is likely to be given off? Remember the formula for sulfuric acid is  $\text{H}_2\text{SO}_4$ .
7. If we had enough of the gas how could we test it to check its identity?
8. How could we have made this practical a fair test?
9. How could we be more certain of our results?
10. Write word equations for the reactions that occurred.
11. Why can you not write word equations for all of the metals that you tested?

Plan of dimple tile



Plan of dimple tile



### Teaching notes and answers

Provide each pair of students with the following:

- small samples of magnesium, aluminium, zinc, iron, copper foils
- beaker of dilute sulfuric acid
- pair of scissors
- pipette
- small piece of glass paper
- dimple tile
- x2 tile plans.

**Carry out an appropriate risk assessment before doing the activity with a class, see [www.cleapss.org.uk](http://www.cleapss.org.uk) for guidance.**

1. We wear goggles to protect our eyes from accidental splashes of the acid
2. To clean the surface of the metal
3. It was already very shiny and it was flimsy and could easily tear
4. The zinc, magnesium and aluminium reacted with the acid; we could see bubbles
5. Magnesium, zinc, aluminium, iron, copper. The number of bubbles and rate that they are produced
6. The metals make a sulfate with the acid, the gas is hydrogen
7. It would put out a lighted splint with a 'pop'
8. Use metal samples of the same size and the same amount of acid
9. Repeat the experiment several times
10. Magnesium + sulfuric acid → magnesium sulfate + hydrogen etc.
11. They didn't all react with the acid