

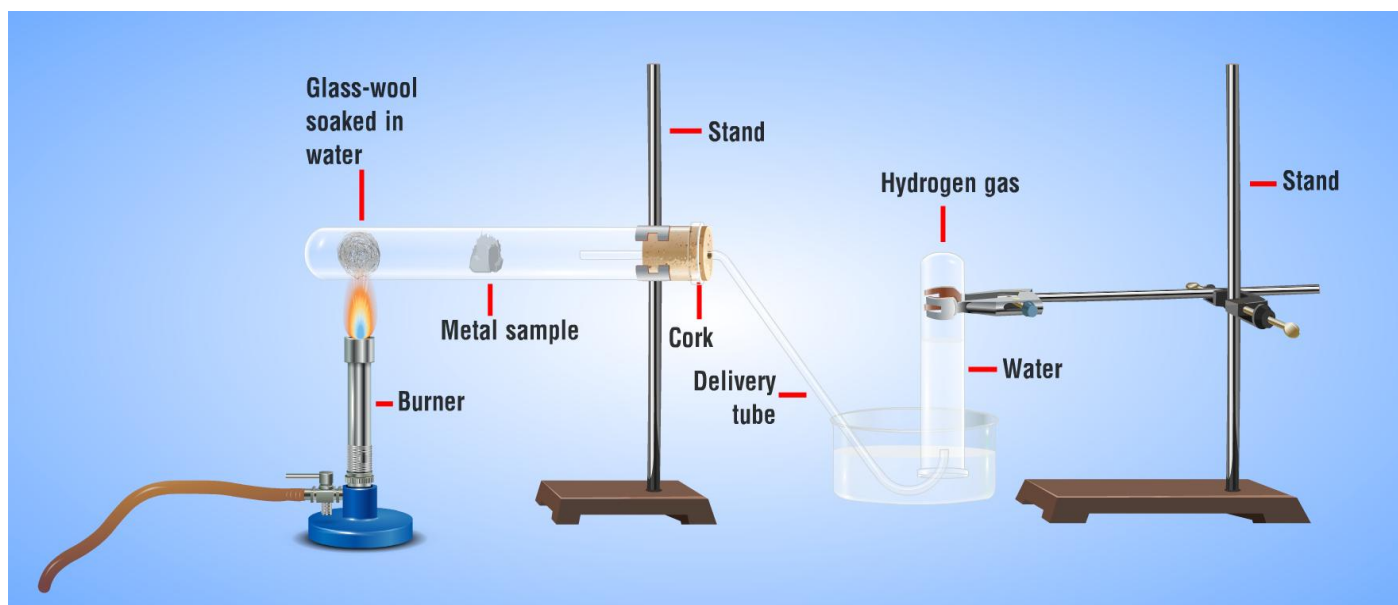
Materials Required

- Metallic samples (sodium, magnesium, zinc, lead, iron, aluminium, and copper)
- Distilled water
- Test tubes
- Test tube stands
- Burner
- Beaker (250 mL)
- Gas jar
- Boiling tube
- Laboratory stand
- Delivery tube
- Trough
- Single bored cork
- Glass wool
- Piece of sandpaper

Procedure

Real Lab Procedure

1. Take seven test tubes, each half filled with cold water. Place them in a test tube stand.
2. Put small samples of clean metallic substances in these seven test tubes.
3. Observe the test tubes to identify the metals that react with cold water.
4. The order of reactivity in different test tubes can be compared by carefully observing the rate of formation of bubbles of liberated hydrogen gas in the test tubes.
5. Boil about 100 mL of water in a beaker.
6. Take out the metallic pieces from the test tubes that did not react with cold water in steps 2 and 3.
7. Put these metallic pieces in test tubes, half filled with hot water.
8. Observe the test tubes to identify the metals that react with hot water.
9. Also, compare their order of reactivity by observing the bubbles of liberated hydrogen gas in the test tubes.
10. Take out the metallic substances from the test tubes that neither react with cold water nor hot water, and they can react with steam.
11. To see the reaction of metallic substances (as identified in the above step) with steam, arrange the apparatus and observe their reaction with steam.
12. Arrange the metals in decreasing order of reactivity with water under different conditions.



Simulator Procedure

Metal reaction with cold water:

1. Show the apparatus of arranging seven test tubes with cold water.
2. Click on the circle icon to learn about the metal type and colour.
3. Click to drag, take a spatula of sodium, and transfer it into test tube A. Observe the change that happens in a test tube.
4. Click to drag, take a spatula of magnesium, and transfer it into test tube B. Observe the change happens in a test tube.
5. Click to drag, take a spatula of zinc, and transfer it into test tube C. Observe the change that happens in a test tube.
6. Click to drag, take a spatula of lead, and transfer it into test tube D. Observe the change that happens in a test tube.
7. Click to drag, take a spatula of iron, and transfer it into test tube E . Observe the change that happens in a test tube.
8. Click to drag, take a spatula of aluminium, and transfer it into a test tube to observe the reaction.
9. Click to drag, take a spatula of copper, and transfer it into test tube G to observe the reaction.
10. Click on the Next button to proceed to the next step.

Metal reaction with hot water:

1. Click on the knob to switch it on and heat the water in a beaker.

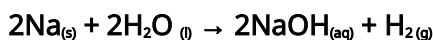
2. Drag and transfer the water to the test tubes A, B, C, D, E, and F, respectively.
3. Drag to take and transfer a spatula of magnesium to test tube A to observe the change.
4. Drag to take and transfer a spatula of zinc to test tube B to observe the change.
5. Drag to take and transfer a spatula of lead to test tube C to observe the change.
6. Drag to take and transfer a spatula of iron to test tube D to observe the change.
7. Drag to take and transfer a spatula of aluminium to test tube E to observe the change.
8. Drag to take and transfer a spatula of copper to test tube F to observe the change.
9. Click on the Next button to proceed to the next step.

Metal reaction with steam:

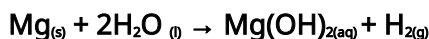
1. Click on the boiling tube, cotton wool, single-holed cork, and delivery tube one by one to make a set-up steam apparatus.
2. Click on the Next button to proceed to the next step.
3. Click on the metal zinc placed on the watch glass and turn on the flame knob and observe the change.
4. Click on the metal iron placed on the watch glass and turn on the flame knob and observe the change.
5. Click on the metal aluminium placed on the watch glass and turn on the flame knob and observe the change.
6. Click on the metal lead placed on the watch glass and turn on the flame knob and observe the change.
7. Click on the metal copper placed on the watch glass and turn on the flame knob and observe the change.

Observations

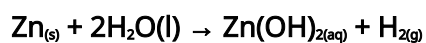
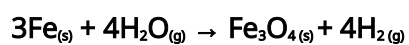
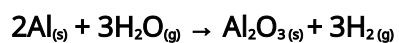
Sodium reacts violently with cold water. The reaction is so violent and exothermic in the case of sodium that the evolved hydrogen immediately catches fire.



Magnesium does not react with cold water. It reacts with hot water to form magnesium hydroxide and hydrogen. It also starts floating due to the bubbles of hydrogen gas sticking to its surface.



Metals like **aluminium**, **iron** and **zinc** do not react either with cold or hot water. But they react with steam to form the metal oxide and hydrogen.



Metals such as **lead**, and **copper** do not react with water at all.

Observations are given in the table

Sl.no	Metals	Cold water	Hot water	Steam
1	Sodium	React violently	-	-
2	Magnesium	-	React violently	-
3	Zinc	-	-	Reacts readily
4	Lead	No reaction	No reaction	No reaction
5	Iron	-	-	Reacts readily
6	Aluminium	-	-	Reacts readily

7	Copper	No reaction	No reaction	No reaction
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Results and Discussion

From the observation, it is clearly known and concluded that the different types of metals react with water under different conditions, such as cold, hot, and steam.

Precautions

- Be careful when handling sodium metal because it can react with skin moisture.
- All samples of metallic compounds under examination should have the same amount of exposed surface area.
- Sandpaper should be used to clean all metals, apart from sodium.