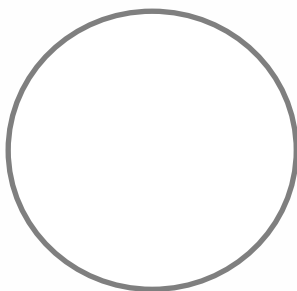




Escape room puzzles

For each puzzle, do (or watch) the reaction and decide which statement correctly describes what is occurring.

Puzzle 1 – Soluble and insoluble



Put a few crystals of lead nitrate and potassium iodide either side of the small circle. Take care not to touch the crystals. Add a drop of water to the circle.

Using splints, slowly push the crystals into the water at the same time and observe what happens.

1. The reactant molecules diffuse towards each other and combine in a chemical reaction. The newly formed lead iodide molecules appear as a yellow solid.
2. The soluble ionic compounds dissolve in the drop, diffuse towards each other and react together to form a lead iodide precipitate and an aqueous solution of potassium nitrate.
3. The soluble ionic compounds dissolve in the drop, diffuse towards each other and react together to form a potassium nitrate precipitate and an aqueous solution of lead iodide.
4. One of the reactants is soluble in water and the other is insoluble in water. The insoluble compound diffuses to the middle of the drop and appears as yellow solid.

Puzzle 2 – Thermochromic colour change



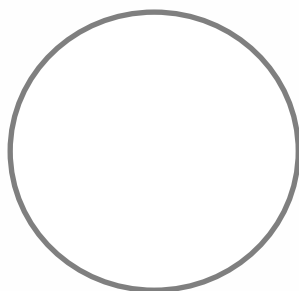


Place a thermochromic sheet on the square. Rub with your finger and observe any change in the sheet. Add a drop of sodium hydroxide to the middle of the thermochromic sheet, followed by a drop of sulfuric acid. Observe.

Which statement accurately describes what is being observed?

1. The sheet changes colour to green, indicating pH 7 on the pH scale as a neutralisation reaction occurs, forming sodium sulfate and water.
2. A neutralisation reaction occurs which forms a green reaction intermediate, which disappears as it dissolves into the water.
3. An exothermic neutralisation reaction happens, which is shown as a change in colour of the thermochromic sheet. This fades as heat is lost to the surroundings.
4. An endothermic neutralisation reaction happens, which is shown as a change in colour of the thermochromic sheet. This fades as heat is lost to the surroundings.

Puzzle 3 – A displacement reaction

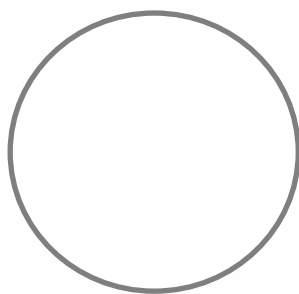


Put a drop or two of silver(I) nitrate into the small circle. **Try not to touch this solution as it can stain your skin.** Place a piece of copper wire into the solution and observe for several minutes. Use a magnifying glass or USB microscope if available.

1. Copper atoms displace silver ions in the solution by losing electrons in an oxidation reaction to form copper ions. Silver ions gain electrons in a reduction reaction to form silver atoms.
2. Silver atoms displace copper ions in the solution by losing electrons in an oxidation reaction to form silver ions. Copper ions gain electrons in a reduction reaction to form copper atoms.
3. Copper atoms displace silver ions in the solution by gaining electrons in a reduction reaction to form copper ions. Silver ions lose electrons in an oxidation reaction to form silver atoms.
4. Silver ions displace copper atoms in the solution by losing electrons in a reduction reaction to form silver atoms. Copper ions gain electrons in an oxidation reaction to form copper atoms.



Puzzle 4 – Conductivity



Place a drop of distilled water into the circle. Place the electrodes of a conductivity meter into the drop and observe the LED. Mix a few crystals of sodium chloride into the drop, place the electrodes of the conductivity meter back into the drop and observe the LED again.

1. The conductivity meter does not light up in the drop of water until crystals of sodium chloride are added. This is because when sodium chloride is added, there are now delocalised electrons present which are free to move.
2. The conductivity meter does not light up in the drop of water until crystals of sodium chloride are added. This is because when sodium chloride is added, the sodium chloride molecules are free to move.
3. The conductivity meter does not light up in the drop of water until crystals of sodium chloride are added. This is because when sodium chloride is added, the sodium and chlorine atoms are free to move.
4. The conductivity meter does not light up in the drop of water until crystals of sodium chloride are added. This is because when sodium chloride is added, the sodium and chloride ions are free to move.