Diffusion of gases on a microscale – student sheet

In this experiment you will be observing the diffusion of the gases ammonia and chlorine. You will be doing this by looking for colour changes as the gases react with drops of test solutions.
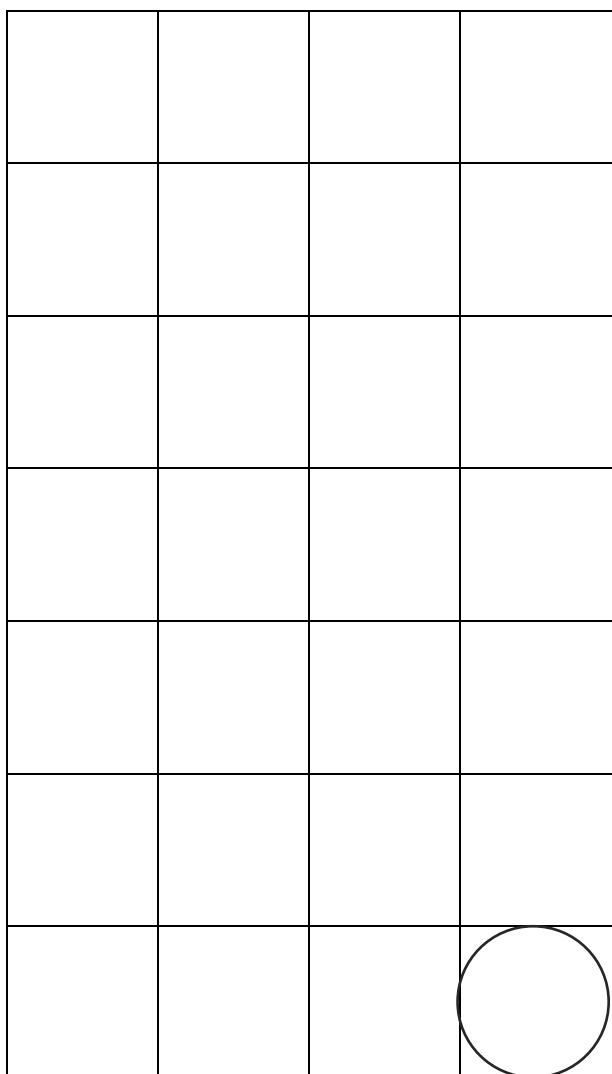
You must wear eye protection.

Instructions

1. Cover the worksheet with a clear plastic sheet.

2. Place two drops of copper(II) sulfate solution in each square (except the one with the circle) of the left hand grid (the one labelled ammonia).

3. Place one drop of potassium iodide solution in each square (except the one with the circle) of the right hand grid (labelled chlorine). Add one drop of starch solution to each drop.

4. Cut the bottom off two plastic pipettes to make a small vessel and place each on the square with the circle.

5. Carefully put four drops of ammonia in the vessel in the 'ammonia' grid and quickly place a well-plate lid over the grid.

6. Carefully put two drops of bleach and two drops of hydrochloric acid in the vessel in the 'chlorine' grid and quickly place a well-plate lid over the grid.

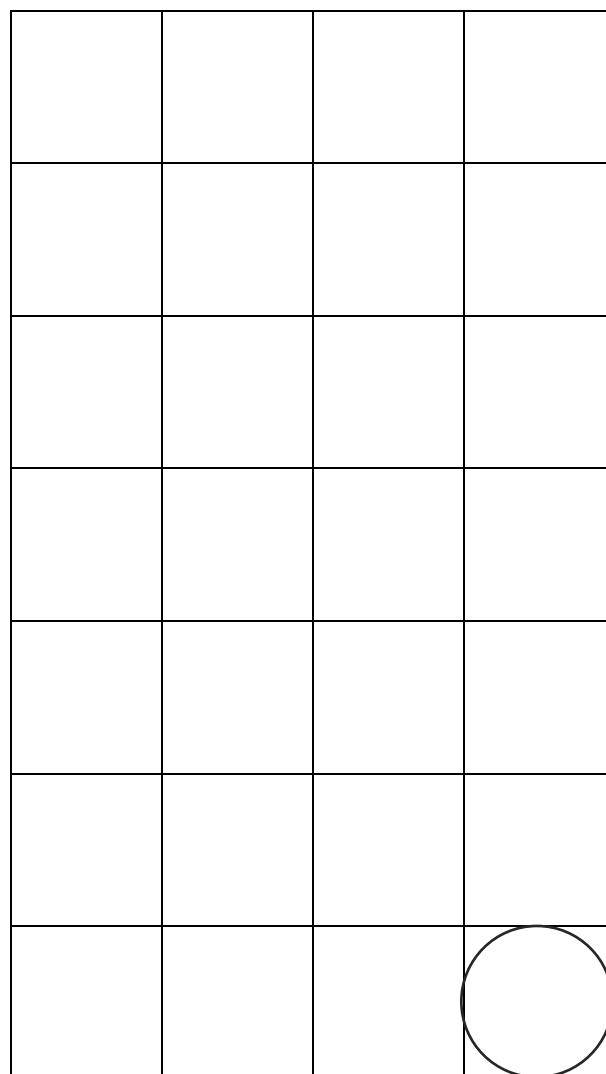7. Record all your observations over the next 20 minutes and give explanations.

Health, safety and technical notes

- Wear eye protection throughout (splash resistant goggles to BS EN166 3).

- Ammonia solution, concentrated NH_3(aq) is CORROSIVE.

- Potassium iodide, KI(aq), 0.2 mol dm^{-3} is low hazard.

- Hydrochloric acid, HCl(aq), 1 mol dm^{-3} is low hazard.

- Copper(II) sulfate solution, $CuSO_4$(aq), 0.2 mol dm^{-3} causes eye damage and is toxic to aquatic life.

- Household bleach solutions (containing sodium chlorate(I)/sodium hypochlorite) sold for the domestic market may be corrosive but is commonly more dilute and irritant. Check the label. Even quite dilute bleach is irritant if more than 0.15 M NaOCl. Some bleaches also contain detergents and thickening agents, which may cause excessive frothing in this experiment. Note that nowadays some commercially available bleaches do not contain any chlorine and are based on peroxy-compounds. They should not be used here.

Grids

Ammonia

Chlorine