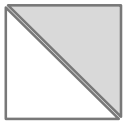
Worksheet 1

Understanding precipitates – solubility rules

Add 2 drops of 0.1 M copper(II) sulfate over the diagonal in the square. Add 2 drops of 0.4 M sodium hydroxide to the 'puddle'. Stir with the pointed end of a wooden splint. Disposal: wipe over the plastic surface with a paper towel. In the squares below, you can try other reactions with available chemicals, e.g., silver nitrate with potassium iodide or sodium carbonate and magnesium sulfate (a 'green' reaction with chemicals available from the local shop).	
     	

Where do the components of the solutions come from?

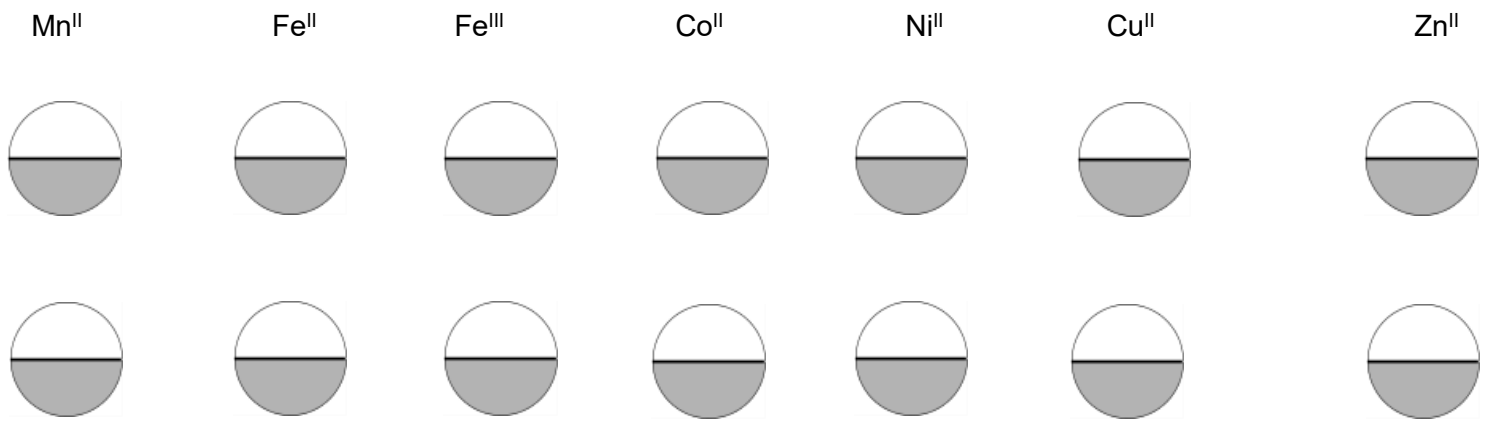
In the small circle on the right, add some copper chloride crystals. Add waterwith a pipette to fill the whole circle and stir with a freshly cut pointed splint to dissolve the solid.				In the small circle on the left, add some anhydrous sodium carbonate. Add water with a pipette to fill the whole circle and stir with a freshly cut pointed splint to dissolve the solid.
With a pipette, move 2 drops of the liquid in the circle on the left into the square in the middle. With another pipette, move 2 drops of the liquid in the circle on the right into the square in the middle. Stir the contents of the square with a freshly cut pointed splint.				

Chemistry of transition-metal ions 1 (with sodium hydroxide)

Wear eye protection

Addition of 0.4 M sodium hydroxide solution

Place 2 drops of 0.1 M salt solution in each circle across the central line.
Along the top row, add one drop of 0.4 M sodium hydroxide solution. Stir with a pointed wooden splint.
Along the second row, add 6 drops of 0.4 M sodium hydroxide solution. Stir with a pointed wooden splint.

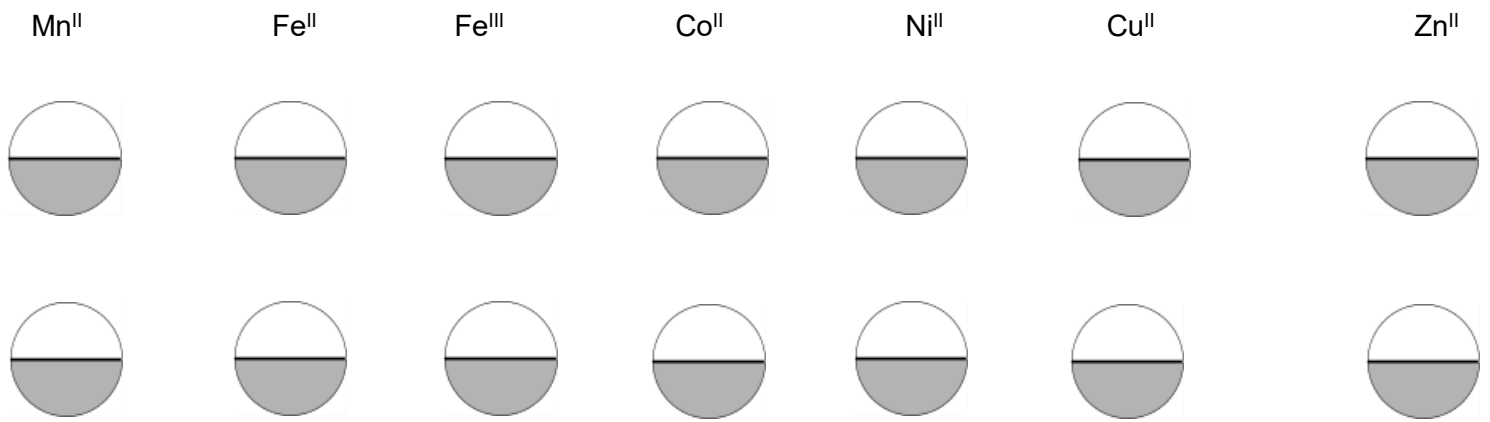


Chemistry of transition-metal ions 2 (with 2 M ammonia)

Wear eye protection
Ensure good room ventilation

Addition of 2 M ammonia solution

Place 2 drops of 0.1 M salt in each circle across the central line.
Along the top row, add 1 drop of 2 M ammonia solution. Stir with a pointed wooden splint. Along the second row, add 6 drops of 2 M ammonia solution. Stir with a pointed wooden splint.

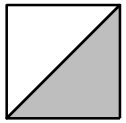
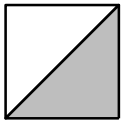
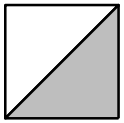
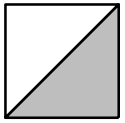
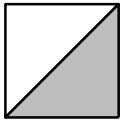
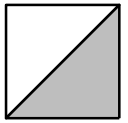


Worksheet 4

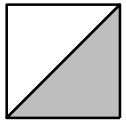
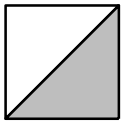
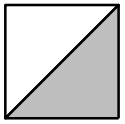
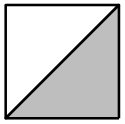
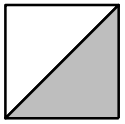
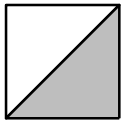
Identification of negative ions (anions)

Use 0.1 M to 0.2 M potassium or sodium salts in the relevant squares.

Wear eye protection

Potassium/ sodium chloride	Potassium/ sodium bromide	Potassium/ sodium iodide	Potassium/ sodium carbonate	Potassium/ sodium sulfate	Potassium/ sodium nitrate
					

Add 2 drops of the relevant solution to each of the squares above. Add 2 drops of 0.4 M nitric acid and 1 drop of 0.05 M silver nitrate. Stir mixtures with a with a pointed wooden splint. Record observations before adding 2 drops of 2 M ammonia.

Potassium/ sodium chloride	Potassium/ sodium bromide	Potassium/ sodium iodide	Potassium/ sodium carbonate	Potassium/ sodium sulfate	Potassium/ sodium nitrate
					

Add 2 drops of the relevant solution to each of the squares above. Add 1 drop of universal indicator solution. To anysolution that is alkaline, add 1 drop off 1 M hydrochloric acid and look for bubbles of carbon dioxide.

Potassium/ sodium chloride	Potassium/ sodium bromide	Potassium/ sodium iodide	Potassium/ sodium carbonate	Potassium/ sodium sulfate	Potassium/ sodium nitrate