

## Practical potions

### *Education in Chemistry*

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<https://rsc.li/3z6cD1c>

**Observe and record chemical changes in this microscale practical with a magical twist. How can you tell that a chemical reaction has taken place?**

### Instructions for learners

When a chemical reaction happens you might see bubbles, fizzing, colour changes or new solids forming. Can you identify when a chemical reaction has taken place? You are going to record your observations in a table.

Add three drops, a single spatula or a single piece of each 'magical' reactant to the corresponding circles. Watch closely. Which combination of reactants resulted in a chemical change?

### Results table

	Elixir of life	Phoenix tears	Snake venom	Vampire blood	Poison (TOXIC)
Dragon whiskers					
Unicorn horn					
Spider eggs					
Monster serum					

## Instructions for teachers

The reactions all take place on a single sheet of A4 paper. Some of the colour changes may be easier to see on coloured paper. The table on the final page of this document can be laminated or placed inside a clear plastic wallet. Learners will add a few drops or a single piece of each reactant to the corresponding circles. Alternatively, you could use spotting tiles.

The reactant names have all been changed to fantasy ingredients. This allows learners to concentrate on the observation and recording of chemical changes without the distraction of chemical names. Labels for dropping bottles, petri dishes or other containers can be downloaded from: <https://rsc.li/3z6cD1c>

Make sure you speak to your technician before decanting reactants into alternative containers. They will be able to advise you on the most suitable materials for storing each reactant and any hazard symbols you should display alongside the fantasy names. You will also need to provide your technician with a list of the chemical names and fantasy names for safe disposal following the lesson.

## Extension

If you have learners who need an extra challenge you could ask them to identify the chemical reactants by giving them clues based on the changes they have observed.

## Disposal

Care needs to be taken when disposing of lead nitrate solution. This is placed in the end column of the table so that it can be soaked up with a paper towel before cleaning the rest of the sheet.

## Instructions for technicians

The following table gives the fantasy name, chemical name and concentration for each of the reactants in *Practical potions*.

<b>Fantasy name</b>	Elixir of life	Phoenix tears	Snake venom	Vampire blood	Poison (TOXIC)	Dragon whiskers	Unicorn horn	Spider eggs	Monster serum
<b>Chemical name</b>	Distilled water	Copper sulfate(aq)	Sulfuric acid	Silver nitrate(aq)	Lead nitrate	Copper wire (2cm)	Calcium carbonate (small chips)	Iron filings	Potassium iodide(aq)
<b>Concentration</b>		0.1M	0.4M	0.1M	0.01M				0.2M

When decanting reactants into containers with fantasy labels they should always also display the correct hazard symbols. If you are using lead nitrate always use the lowest concentration. The drops should be mopped up with a paper towel for correct disposal after the lesson.

## Expected results

Observations may differ depending on the concentration of solutions and the purity of solids used. Some of these reactions may not occur at room temperature or the concentrations used.

11–14 year olds are not necessarily expected to be able to identify where a precipitate has formed and may simply refer to a chemical reaction as being a 'colour change'. Depending on the learning objectives and ability of the class, learners may simply be required to put a tick or a cross in their results table to show if a chemical reaction has occurred.

	Elixir of life (water)	Phoenix tears (copper sulfate)	Snake venom (sulfuric acid)	Vampire blood (silver nitrate)	Poison (TOXIC) (lead nitrate)
Dragon whiskers (copper wire)	No change	No change	No change	New solid formed (grey solid formed on brown wire)	No change
Unicorn horn (calcium carbonate)	No change	No change	Bubbles formed	No visible change	No visible change
Spider eggs (iron filings)	No change	Colour change (solution changes from blue to green, solid changes from black to brown)	Bubbles formed	New solid formed (grey solid formed on black powder)	No change
Monster serum (potassium iodide)	No change	Colour change (solution changes from blue/colourless to reddish brown)	Colour change (solution changes from colourless to slight orange tinge)	Colour change (white precipitate formed)	Colour change (yellow precipitate formed)

	Elixir of Life $\text{H}_2\text{O}(\text{l})$	Phoenix tears $\text{CuSO}_4(\text{aq})$	Snake venom $\text{H}_2\text{SO}_4(\text{aq})$	Vampire blood $\text{ZnSO}_4(\text{aq})$	Poison (TOXIC) $\text{PbNO}_3(\text{aq})$
Dragon whiskers $\text{Cu}(\text{s})$	dragon whiskers + elixir of life	dragon whiskers + phoenix tears	dragon whiskers + snake venom	dragon whiskers + vampire blood	dragon whiskers + poison
Unicorn horn $\text{CaCO}_3(\text{s})$	unicorn horn + elixir of life	unicorn horn + phoenix tears	unicorn horn + snake venom	unicorn horn + vampire blood	unicorn horn + poison
Spider eggs $\text{Fe}(\text{s})$	spider eggs + elixir of life	spider eggs + phoenix tears	spider eggs + snake venom	spider eggs + vampire blood	spider eggs + poison
Monster serum $\text{KI}(\text{aq})$	monster serum + elixir of life	monster serum + phoenix tears	monster serum + snake venom	monster serum + vampire blood	monster serum + poison