

Why should we believe in the reactivity series?

Education in Chemistry

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Chemists use theoretical ideas to explain their observations and make predictions about what will happen in different circumstances. But how much should we 'believe' in these ideas? And what kind of evidence gives us *good* reason to support an idea?

Theoretical idea: Metals in the periodic table can be ordered according to their reactivity. The order in decreasing reactivity is K, Na, Li, Ca, Mg, Al, Zn, Fe, Cu, Ag, Au.

The results of the experiments in the table all support the theoretical idea of a reactivity series *to some extent*.

1. Use your knowledge of the reactivity series to complete the expected observations for each of the experiments (you will probably have seen or carried out these experiments in class).
2. In pairs or small groups complete the rest of the table.
3. Are there any aspects of the reactivity series that are not supported by *any* of the experiments?
4. Do you think you should 'believe' in the reactivity series? Why, or why not?

Experiment	Expected observations	What hypothesis is confirmed by the evidence? Is the experiment good evidence for the hypothesis?	How much does this evidence support the overall theoretical idea of a 'reactivity series'?
Add Cu to a solution of conc. AgNO ₃	<i>Example: The copper gets smaller and silver forms on the surface. The colourless solution turns blue.</i>	<i>Copper is more reactive than silver. The experiment has only been completed once, so might not be reliable.</i>	<i>Not very much: only two metals were used and only one way of comparing their reactivity.</i>
Add Li, Na, and K to water and repeat each experiment three times			
Burn Li, Mg, Fe and Cu in air and in oxygen			
Count the bubbles produced in the reaction of metals (Fe, Mg, Zn, Cu) with dil. hydrochloric acid			
Add Mg, Zn and Fe to a solution of CuSO ₄			