Reactions of acids

Education in Chemistry
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You are going to monitor the reactions of different acids with a range of substances and develop a theory to explain your observations.

Part A

1. Add a small spatula of A to a test tube.
2. Add approximately 2 cm depth of the acid.
3. Note down your observations.
4. Repeat for B–E. As C is not a solid, add 1 cm depth of C and then top it up to 2 cm depth with the acid.

	Hydrochloric acid	Nitric acid	Sulfuric acid
A			
B			
C			
D			
E			

Do you spot any patterns in your observations?

Part B

5. Add a small spatula of A to a test tube.
6. Add approximately 2 cm depth of hydrochloric acid.
7. Feel the temperature of the test tube during the reaction.
8. Test the gas produced with a lit splint.
9. Repeat for B, D and E

	Does the test tube get hotter?	What happens to the lit splint?
A		
B		
D		
E		

Do you spot any patterns in your observations?

Part C

Repeat steps 1–3 with substances F–K.

J and K may need to be heated over a Bunsen burner for a reaction to occur.

	Hydrochloric acid	Does the test tube get hotter?	What happens to the lit splint?
F			
G			
H			
I			
J			
K			

How well does your initial theory about how acids react fit with the data you have now?

Part D

The chemical names for the unknowns are as follows:

A	magnesium (powder)
B	zinc carbonate
C	sodium hydroxide
D	calcium carbonate
E	zinc (powder)
F	sodium carbonate
G	zinc (strip)
H	magnesium (strip)
I	copper carbonate
J	calcium oxide
K	copper oxide

Use this information as well as your observations to construct a theory about how acids react. Include details about any more experimental work you would carry out to confirm your theory.

Teacher notes

At the end of part A, students might point out that the solids react with acids to form bubbles and the solution does not.

At the end of part B, students might point out that the ones that get hotter (A and E) also form a gas that burns with a squeaky pop (they may be able to identify this as hydrogen), but the other two put the splint out. They may suggest that grey powders have this effect, but white powders form a different gas and are not exothermic.

At the end of part C, students should be able to identify that not all solids react to form gases (the two metal oxides act as counterexamples), and some solutions will. They might also suggest that colour of the substance does not indicate how it will react, and that metals seem to react differently (G and H are identifiably metallic where A and E are not) to other substances.