

Observing Changes

February 19, 2002

Question: How can we recognize physical and chemical changes?

Hypothesis: We can do many tests to find out whether it was physical or a chemical change. The substance could change form but if it wasn't permanent and could be changed back into its original form then it would be a physical change. If the substance changed into a new substance and was not able to change back to its original form it would be a chemical change.

Comment: But how would we know that a chemical change is taking place...what are the signs???..Planning..Level 3+

Design: We observed four experiments: i) water and copper sulfate
ii) iron and copper sulfate solution
iii) Sodium Carbonate and copper sulfate solution
iv) Hydrochloric acid and magnesium

We saw that in Part 1 there was a physical change and in Parts 2, 3, 4 were all chemical change since we couldn't get the substances back to their original form. We mixed 2 substances in each part and observed any change whether it was a chemical change or physical change and recorded what was seen, but there was always some type of change. In Part 1, colour changed, in Part 2, steel wool changed colour and texture, in Part 3, the substance changed its state by becoming a solid, and in Part 4, one of the substances (magnesium) actually disappeared.

Materials: See pg.32 in textbook

Procedure: See pg.32 in textbook

Evidence (Results):

Comment: Excellent organization of your results!!..Level 4+

Part	Starting substance		Observations after making	Inference chemical physical	Evidence
1	Name Water	Properties - Clear, colourless, odourless liquid	- copper sat at the bottom of tube at first - was shook and then the crystals were gone and a blue liquid was left	Physical	Water changed colour and could then be evaporated leaving the copper sulfate
	Copper (II) sulfate	- blue powdery crystals			

2	Iron	-lustrous, silverish, wiry metal -smelt like metal	- steel wool was placed in the blue liquid and turned into a copper colour	Chemical	Steel wool changed colour and became more brittle and couldn't be put back to original form making it a chemical change
	Copper Sulfate	-Blue liquid			
3	Sodium Carbonate	-clear, colourless, odourless liquid	-when the sodium carbonate was added it precipitated at the top, a thick cloudy layer and then settled at the bottom forming a solid	Chemical	A solid formed at the bottom of the test tub after precipitating and allowing it some time to settle to the bottom and couldn't become its original state making it a chemical change
	Copper Sulfate	-Blue liquid			
4	Hydrochloric Acid	-Clear colourless, odourless liquid	-bubbles of gas start fizz around the magnesium and is afloat over the hydrochloric acid -smoke starts to form and then forms vapour around the top of test tube -Test tube is gradually getting warmer -Near top of tube condensation appears -Magnesium disappears	Chemical	-Magnesium was bubbling and had disappeared (was not in hydrochloric acid) and therefore couldn't be changed back into its original state making it a chemical change.
	Magnesium	-Malleable, silver, lustrous metal -when substances were put together smelt like metal			

Analysis:

Comment: Excellent!! Level 4

a) What kind of change took place when you mixed the substances in each part of the investigation? What evidence do you have? Does this support the hypothesis?

There were two types of change physical and chemical. The evidence I have is in Part 2, 3, 4 were all chemical changes because there was no way to turn these substances back into their original state. In Part 2, iron and copper sulfate solution were mixed together and the steel wool turned a copper colour and became more brittle as when we washed it down the sink it started to break down and become powder-like. In Part 3, the sodium carbonate and the copper sulfate solution formed a solid solution after



leaving it to settle down and wouldn't be able to return to its original form even when it was heated since it would be two substances in one. In Part 4, a piece of magnesium was put into hydrochloric acid and started to create bubbles which probably the acid eating the magnesium until it was gone, and therefore couldn't be returned into its original state. In Part 1, the change was physical because the liquid could be evaporated and just leave the copper sulfate behind back in its original form. This supports my hypothesis because I said that if the substance created a new form and was irreversible then it was a chemical change, but if the change was not permanent and was reversible the change would be physical.

b) In each part of this investigation, identify what physical properties changed?

Part 1: The liquid's colour changed and became blue. The liquid was still transparent but wasn't as clear compared to before the copper sulfate was added.

Part 2: The colour of the steel wool changed and became a copper colour. The texture of it changed and became more brittle and became duller compared to when it was shiny at first.

Part 3: The color of the blue became a whitish milky blue colour. The texture of it was chunky at first and then settled down and became a liquid. The substance was dull and at first was cloudy and then became opaque.

Part 4: There was no real change in the liquid at the end since the magnesium was gone by then so it was back to its clear substance. The only thing that changed was the magnesium strip since it disappeared.

c) Look at Table 2 on page 30. Which of those clues did you observe?

- i) A new colour appears.
- ii) Bubbles of gas are formed.
- iii) A solid material (called a precipitate) forms in a liquid.
- iv) The change is difficult to reverse.

d) Which of the changes you observed might be reversed? Explain how.

In Part 1, these changes could be observed because if I took the substance and heated it up until the water evaporated leaving behind the copper sulfate crystals, which was its original form.

Evaluation: If I were to do this lab again I would make sure that I could find clean test tubes because when I did my lab there were still some particles stuck onto the bottom of the test tube which could've affected my experiment. This observation could be extended by trying to return the substances into original

Comment: Good (level 3+), but as you reflect on the lab, you should also reflect back on your hypothesis and compare it to the results and conclusions you drew from the experiment!

form like in Part 1 since it is a physical change, but could also try doing it for the other parts since then you would definitely know if it was a chemical or physical change depending on if they change back or not. An error that I encountered was when I should've tried washing out the test tubes first before using them since many of them contained many particles laying at the bottom of them and most probably had many germs, etc in them that could've affect how the substances reacted to each other. Another error was when at times I would forget and take my safety goggles off which could have been dangerous if something had exploded, etc which next time I will be more aware of and take all necessary safety precautions.

So I concluded in this experiment I discovered that if substances were mixed together they would produce either a chemical or physical change. They would either mix with each other to create a new substance that could not be turned back into its original form or be able to return to its original form which was what I had said in my hypothesis.

Bibliography: Textbook