

Demo #2 – Like Dissolves Like **Water-Based vs. “Permanent” Markers**

Useful in Units: Solutions, Physical Chemistry, Organic, Bonding

Background and Uses

This is about as easy a demo to do as there is and it has good Real World Connections. I first show the students this demo in the Solutions Unit to illustrate that “Like Dissolves Like”. I use it again in the Organic Unit to re-illustrate the point. This demo can be used to alter the Paper Chromatography Demo in the Physical Chemistry Unit to show general solubility issues and how they affect the Separation of Mixtures.

Alterations to try and pitfalls for this demo:

1. The more porous the object you write on, the harder it will be to remove the ink – don’t use paper.
2. Don’t allow the permanent marker to stay on the object for an excessive amount of time – it may be difficult to remove completely.
3. Acetone will dissolve plastic. Make sure the object you write-on is not dear to you.
4. Try using Nail Polish Remover instead of Chemical Storage Acetone to show how students can remove Permanent Marker at home.

Concepts the Demo Illustrates:

“Like Dissolves Like”, Polar vs. Non-Polar, Oil-Based vs. Water-Based Mixtures

Where I found this demonstration:

This is one I came up with myself, though I’m sure that many other teachers have thought up and used this demo for an example of “Like Dissolves Like”.

Procedure

Materials required: Permanent Marker, Water-Based Marker, Acetone, Small Dry Erase Board (or other object to write-on), Water, Paper Towels

Procedure:

1. Write-on Dry Erase Board with both Permanent Marker and Water-Based Marker.
2. Show how the Permanent Marker can't be washed off with Water, but can with Acetone. (Using towel)
3. Show how the Water-Based Marker can't be washed off with Acetone, but can with Water. (Using towel)
4. Discuss

What to illustrate with this demo:

This demo is great at illustrating the difference between Non-Polar and Polar Substances and how "Like Dissolves Like" (Non-Polar dissolves Non-Polar and Polar dissolves Polar).

To relate this to the Real World explain how the common term for Non-Polar mixtures is "Oil-Based" and for Polar mixtures is "Water-Based". This is why there are basically two types of paint: Oil-Based and Water-Based. This is also why a mechanic might use gasoline to wash grease off his/her hands instead of water.

You could also go into how soap is the bridge between Non-Polar and Polar mixtures/substances or why some Organic compounds can be absorbed into the bloodstream through skin. (Both the Organic compounds and the fat under your porous skin are Non-Polar – the fat dissolves the compounds. Turpentine and Gasoline can cause Renal Failure if enough is absorbed.)

Some Safety Stuff: (This list may not be a full list of safety procedures. Please always think ahead and use caution when working with any chemicals.)

1. Acetone is a carcinogen – it is recommended that you use rubber gloves when handling acetone.