

**Buffered Solution and pH of Household Food and Cleaners**

There are several options available for this kit.

SAFETY NOTE: The universal indicator has ethanol as a solvent. Note that this is flammable and should be handled appropriate. MSDS is present here(<https://www.fishersci.com/store/msds?partNumber=S25363&productDescription=UNI+INDICATOR+SOLUTION+500ML&vendorId=VN00115888&countryCode=US&language=en>) and in the kit. Ensure that the cap is on tight before returning. Ensure not to light any flames near bottle if another demonstration will be performed this day.

**Chemical available:**

50 ML Universal Indicator.

Bottle of clear soda

Water

White Vinegar (15% Acetic acid)

Bleach

Sodium Carbonate Buffer (1M pH 7).

pH paper.

**Materials for demonstration provided in kit:**

six small Erlenmeyer flasks.

50mL graduated cylinder

Waste container

Funnel for waste

**Materials you may want to provide:**

An alternative to using the provided universal indicator is to use red cabbage indicator. To do this, you chop up half head of red cabbage (do not get any other red lettuce like species, it must be red cabbage). Put in 2-3 cups of water. Bring water to a boil. Remove from heat. Strain cabbage. Use as universal indicator.

You may also want to simply suggest this as an option for students to do at home with siblings, cousins or other impressionable youth to test the pH of common household species.

**Procedure for in class demo**:

This is very customizable to your own preference, pH paper, universal indicator, and instructions for preparing cabbage indicator are provided. Adjust procedure as desired to use these options instead of the described option below.

In three of the Erlenmeyer flasks place 10 mL of water and 10 drops of indicator (universal or cabbage).

In the other three Erlenmeyer flasks place 10 mL of buffer and 10 drops of indicator (universal or cabbage).

Draw attention to the water flasks. In turn add 20 mL of either soda, vinegar or bleach. Note the change in pH. And discuss.

Draw attention to the buffer flasks. In turn add 20mL of either soda, vinegar or bleach. Note the change in pH. Compare to the change in pH of the water flask.

Note: Carbonate was specifically chosen as the buffer not just because it is a buffer at pH 7, but also because it is a main component of the blood buffer system. This give the option of using this as a lead in to discuss the blood buffer system, or to simply mention that this is why we are able to eat acidic food and create acidic metabolites without disrupting our pH. Slides for this are include in the powerpoint document.

**Waste:**  Pour all species into waste bottle and return to stockroom.