# Indicators – making a Universal Indicator

**Follow the instructions carefully**. **WEAR EYE PROTECTION.**

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| **Step 1:** **Step 2:** **Step 3:****Step 4:****Step 5:** | Put **2 TO 3 drops** strong acid into circle **A1** to create one large drop. Repeat for each circle **A2** – **A5.**Now use the solutions named at the top of the other columns (i.e. instead of the acid) to repeat **Step 1** for **B1** – **B5**, **C1** – **C5**, **D1** – **D5** & **E1** - **E4**3Put **1 drop** of **bromothymol blue** into each circle **A1** to **E1**; **1** drop of **methyl orange** in **A2** – **E2** and **1** drop of phenolphthalein in **A3** – **E3.**Make a mixture of indicators (do this in the glass vial or well plate) using the recipe in the green-shaded box below.Put **1 drop** of your mixed indicator into each solution in circles **A4** – **E4**. Make a note of your observations (take a photo?). |
|  | **pH = 1****Strong acid** | **pH = 4 Buffer****Weak acid** | **pH7 Buffer****Neutral** | **pH 9****Weak Alkali** | pH = 13Strong Alkali |
| **Indicators** | bromothymol blue**(BB)** | A1 | B1 | C1 | D1 | E1 |
| **methyl orange****(MO)** | A2 | B2 | C2 | D2 | E2 |
| **Phenolphthalein****(PP)** | A3 | B3 | C3 | D3 | E3 |
| **Mixed indicator:****BB** = 10 drops**MO** = 5 drops**PP** = 5 drops | A4 | B4 | C4 | D4 | E4 |
| **Commercial Universal Indicator** | A5 | B5 | C5 | D5 | E5 |
| **Extension 1Distilled water and Tap water with your Mixed Indicator**  |  |  | **Extension 3Can you make a buffer between 4 and 7 and test it?** |  |  |
| **Extension 2Distilled water and Tap water with commercial Universal Indicator** |  |  | **Extension 4Can you make a buffer between 7 and 9 and test it?** |  |  |