Supporting Information

Mobile app to quantify pH strips and monitor titrations: smartphone-aided chemical education and classroom demonstrations

Smart pH Reader – Students' Handout

The Importance of pH

The pH of Common Solutions

What is Acid-Base Titration?

$$CH_3COOH + NaOH \quad CH_3COONa + H_2O$$

_____ _____

Let's get started!

Experiment 1: Determining the pH of three different solutions

three

Step 1: Prepare the following solutions in a beaker

Lemon or Lime Juice Solution
Windex Solution
Vinegar
Baking Soda Solution

Dry Ice in Water

Step 2: Measure the pH of the solution using universal pH paper

Step 3: Measure the pH of the solution using a more accurate pH paper

Step 4: Measure the pH of the solution using either Smart Paper Reader App or a pH meter

Experiment 2: Acid-Base Titration

vs

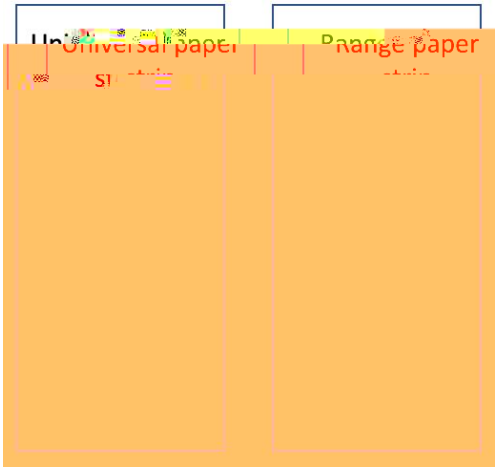
Group 1 & 2:

Group 3:

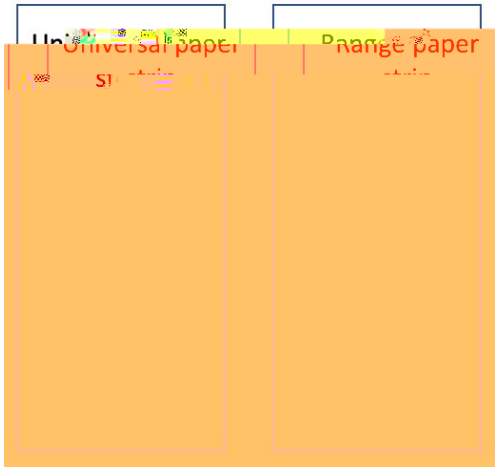
Experiment 1 (Group 1)

(Tape your dry pH paper strips in the provided boxes below)

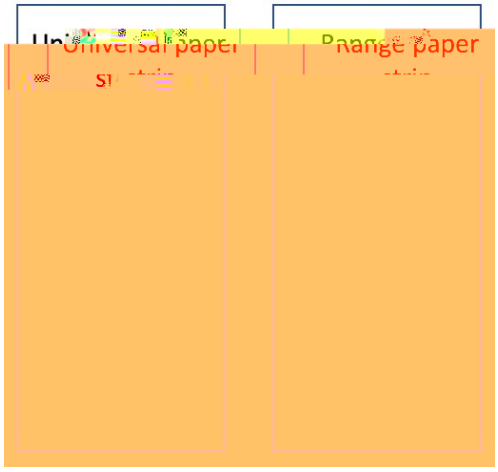
Solution: Lemon Juice



Solution: Baking Soda



Solution: Windex

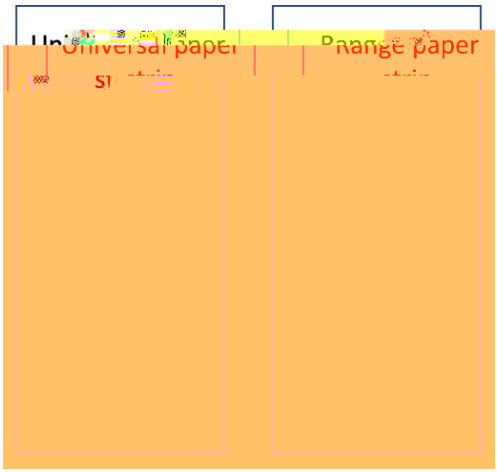


Experiment 1 (Group 2)

Experiment 1 (Group 3)

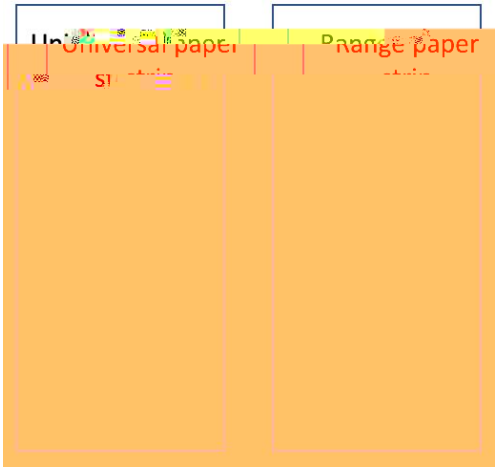
(Tape your dry pH paper strips in the provided boxes below)

Solution: Lemon Juice



Solution: Baking Soda

Solution: Windex



Experiment 1 (Group 3)

(Tape your dry pH paper strips in the provided boxes below)

Solution: Lime Juice

Solution: Dry Ice

Solution: Vinegar

Experiment 2: Vinegar Titration with NaOH Using a Universal Indicator (Group 1)

NaOH Volume (mL)	Smart Indicator Reader reading
0	
4	
8	
10	
11	
12	
13	
14	
15	
16	
17	
18	

Experiment 2: Vinegar Titration with NaOH Using a Universal pH Paper (Group 2)

NaOH Volume (mL)	Smart Paper Reader reading
0	
4	
8	
10	
11	
12	
13	
14	
15	
16	
17	
18	

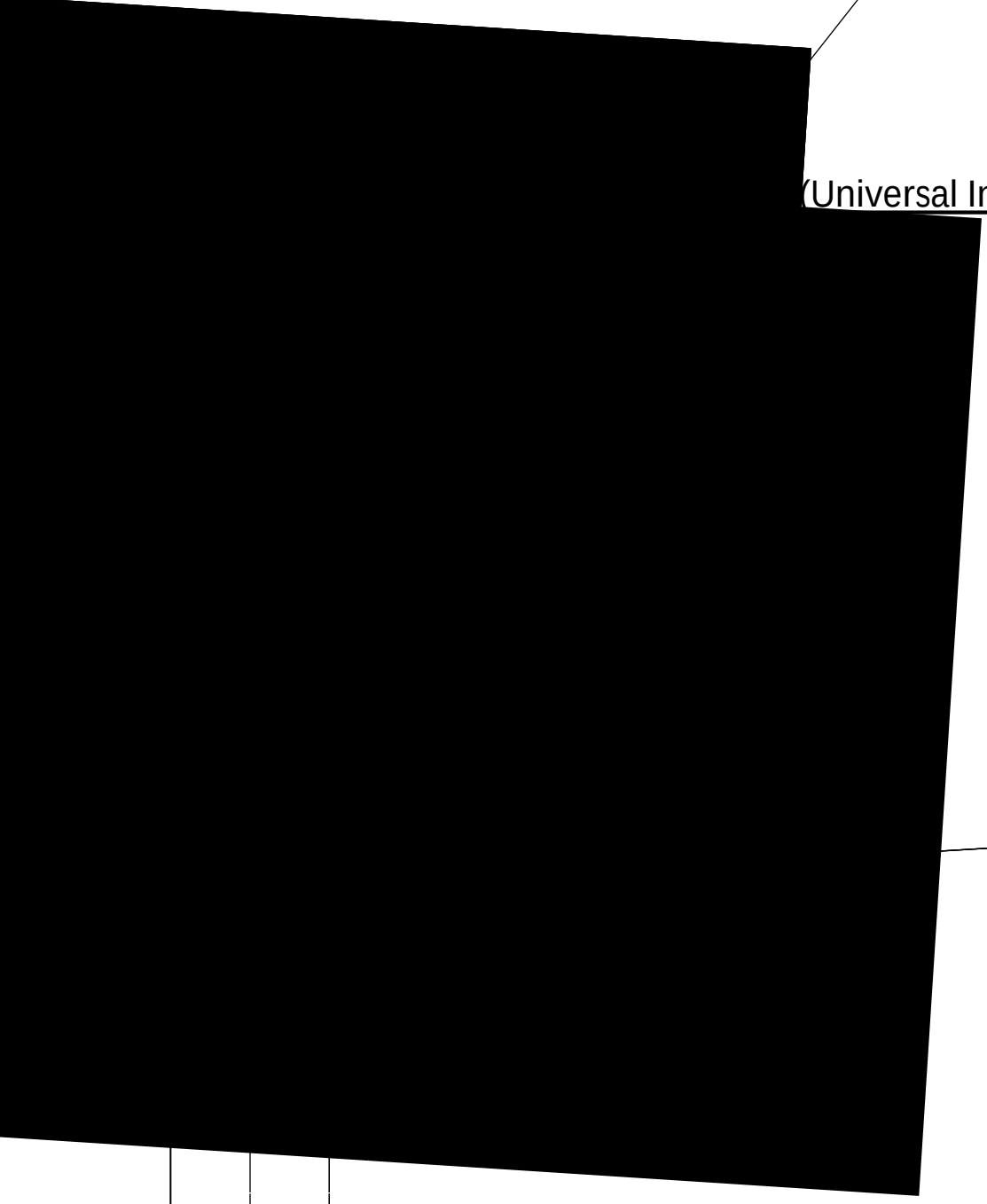
Experiment 2: Vinegar Titration with NaOH Using a pH Meter

(Group 3)

NaOH Volume (mL)	pH meter reading
0	
4	
8	
10	
11	
12	
13	
14	
15	
16	
17	
18	

Experiment 2: Titration Curve (Universal pH Paper)

(Universal Indicator)



Experiment 2: Titration Curve (pH Meter)

Use the scrap paper at the end of this handout to do your calculation.

What is your vinegar solution concentration? _____

Application Download and Setting

DO NOT “Download anyway”

Reading the pH Paper:

Scrap paper for calculations

Vinegar concentration: 5% acetic acid per volume

Acetic acid molar mass: 60 g.mol^{-1}

Acetic acid density: 1.05 g/cm^{-3}

NaOH concentration: 1.0 M.