# Lab 10 - Intro to pH

Activity

**Summarize main points from each video.**

**Video Title / topic** _____

**Video Title / topic** _____

**Video Title / topic** _____

# Topic Introduction

**Summarize your understanding of each paragraph.**

The measure of pH is related to hydrogen ion concentration of a solution. Solutions with a high concentration of hydrogen ions have a low pH and solutions with a low concentrations of H+ ions have a high pH.

The pH scale is used to rank solutions in terms of acidity or basicity (alkalinity). Since the scale is based on pH values, it is logarithmic, meaning that a change of 1 pH unit corresponds to a ten-fold increase or decrease.

Solutions with a pH less than 7 are acidic.
Solutions with a pH greater than 7 are basic.

The natural color (dye) from a red cabbage is useful in determining the pH of a solution. By boiling a red cabbage for 10-15 minutes in water, the resulting purple “juice” can be used to determine whether a solution is acidic or basic.

# Read/Summarize Text

1. **Read the passage.**
2. **Underline key expressions in each sentence.**
3. **Re-write each word (or expression) you underlined.**
4. **Summarize the passage.**

*pH Universal Indicator.*

1

2

A universal indicator is a pH indicator composed of a solution of several compounds that exhibits several smooth color changes over a pH value range from 0 to 14 to indicate the acidity or alkalinity of solutions, where 7 indicates neutral.

A universal indicator is collectively a mixture of indicators which show a color change in a solution, which interprets how acidic or basic a solution is. A universal indicator can be in paper form or present in a form of a solution

https://en.wikipedia.org/wiki/Universal_indicator

*Re-write words you underlined*

3

_____ _____ _____

_____ _____ _____

*Using a complete sentence, summarize or rephrase the passage*

4

# Read Text for Comprehension

Read this article for deeper understanding.  No summary is required, although you may want to circle, underline, or mark key ideas and words.

By definition, an indicator is a substance that changes color in different pH environments. Universal indicator is a brown-colored solution—containing a mixture of indicators—that can be added to any substance to determine its pH. Like all indicators, universal indicator changes color in different pH environments. At low pH, it appears red, and at high pH, it appears blue or violet. At neutral pH, it appears green. Universal indicator can form a continuous spectrum of colors that give an approximate reading of the concentration of protons in a sample.

Water and propan-1-ol are used as solvents. They are both polar and dissolve all the other ingredients in the solution. Sodium hydroxide (NaOH) is an alkaline solution that adjusts the pH of the universal indicator to ensure that each color is shown at the correct pH value. It is necessary to add NaOH to the universal indicator because some of the indicator compounds (e.g. methyl red) are acidic themselves, which would affect the color of the other indicators present. NaOH is added to neutralize the solution.

Methyl red is red at pH <5 and yellow at pH >5. It provides orange and red hues to the universal indicator solution at low pH. The end point of an indicator compound is defined as the pH at which it changes color. The end point of methyl red, therefore, is somewhere around pH 5.

Bromothymol blue is blue at pH >6 and yellow at pH <6. It gives blue and indigo hues at high pH. Its end point is therefore around pH 6.

Thymol blue has two end points: it is red below pH <2, blue at pH >8 and yellow in the middle. Thymol blue allows universal indicator to differentiate low and very low pH by providing another red hue below pH 2. Thymol blue is yellow at pH 7, which, when combined with bromothymol blue (which is blue at pH 7), give a green color.

Finally, phenolphthalein gives universal indicator a deep violet color at very high pH.

https://jameskennedymonash.wordpress.com/2014/09/15/colourful-chemistry-chemistry-of-universal-indicator/

# Draw Illustration

| pH range | Description | Colour |
|---|---|---|
| < 3 | Strong acid | Red |
| 3–6 | Weak acid | Orange or yellow |
| 7 | Neutral | Green |
| 8–11 | Weak base | Blue |
| > 11 | Strong base | Violet or Indigo |

**Draw (Copy) the Illustration Here**

https://en.wikipedia.org

# Interpret a Graph

**Write the title of the graph _____**

**Circle the type of chart this represents**

*Bar Chart* *Line Chart* *Pie Chart* *Other*

**If applicable,**

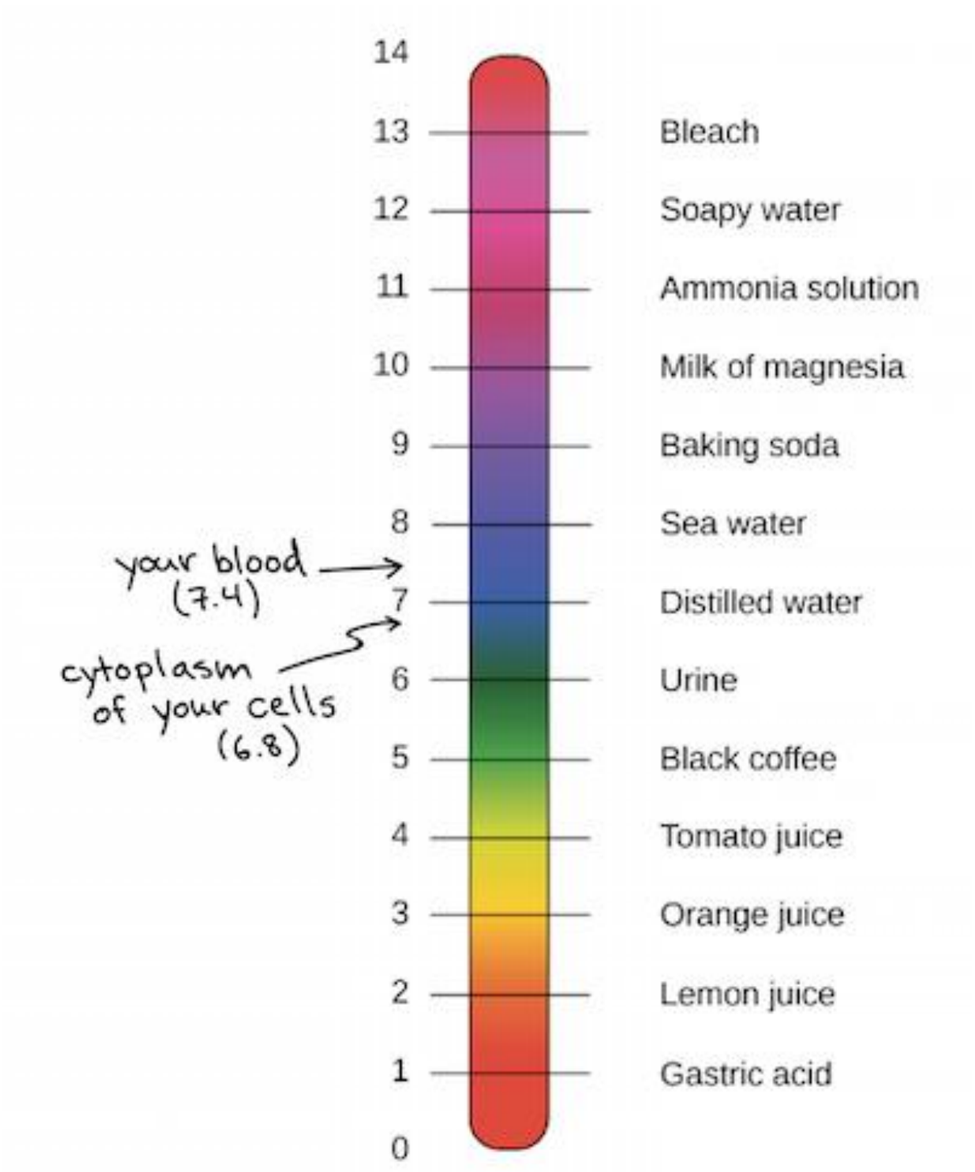
**What does the X-axis represent _____**

**What does the Y-axis imply _____**

**Summarize what this graph represents or conveys**

**_____**

https://www.khanacademy.org



# Show-Off Your Smarts!

**Instructions**

- Complete as an individual or small group.
- Discuss your ideas/answers/responses in a small group.
- Select one person to present your responses to the class.

**Q1. How can this information be applied to a young-person's life?**

**Q2. How does this information apply to (or impact) communities?**

**Q3. When do scientists need to apply this information? How?**

**Q4. How would a person from 100 years ago view this information?**

**Q5. How does this topic connect to other science topics or math?**

*Write down at least three words introduced or covered by this topic.*

1.
2.
3.
4.
5.
6.

# Make a Poster

In the space provided here, create/draw a poster which conveys the concepts you have learned on this topic.