

## pH Rainbow

objective: to teach kids about pH and rudimentary experiment design

materials

phenolphthalein/universal indicator

leucomalachite green/universal indicator

methyl yellow/universal indicator

azolitmin/universal indicator

1 very dilute strong acid (0-2)

1 dilute medium strength acid (3-4)

1 weak acid/base (5-8)

1 weak base (8-10)

1 dilute strong base (12-14)

1 unknown between 0 and 14, midrange recommended, for safety.

- 1) Arrange the determined substances in order of increasing pH. Explain to the children that pH measures how acidic or basic a substance is.
- 2) The different indicators show the following ph ranges:

Indicator	Ph range 1	Color change 1	Ph range 2	Color change 2
Leucomalachite	0-2	Yellow→green	11.6-14	Green→clear
Methyl yellow	2.9-4.0	Red→yellow	-----	-----
Azolitmin	4.5-8.3	Red→blue	-----	-----
phenolphthalein	8.3-10.0	Clear→purple	-----	-----

- 3) Use the appropriate indicator on each sample, and tell the students the pH values.
- 4) Tell the students that they must identify the unknown; each group gets 4 samples of the unknown, and access to each indicator. Students should plan out the experiment before executing, and should be helped with chemicals by mentors.
- 5) A 'successful' experiment is any one that correctly identifies the unknown, but generally speaking will involve the process of elimination and understanding of the pH gradient.