

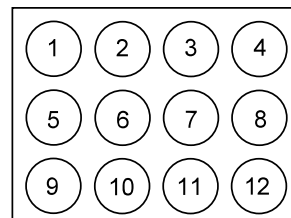
What makes a substance acidic, basic, or neutral? Why do we classify lemon juice and vinegar as acids, and drain cleaner and ammonia window cleaner as bases? Acids and bases are common chemical compounds that can be grouped according to their physical and chemical properties. Another useful property is their effect on indicators (substances that turn different colours in acids and bases).

Question

What are some characteristic properties of acids and bases when they react with indicators?

Materials

- apron
- microtray
- safety goggles
- 7 solutions (see results chart)
- dropper bottles
- 7 indicators (see results chart)



Method

1. Orient the microtray so 4 wells are horizontal and 3 are vertical (see diagram).
2. Place approximately 6 drops of HCl into each well numbered 1 to 4.
3. Dip the end of a small piece of red litmus paper into well 1 and record any colour change (i.e. did it turn blue?).
4. Dip the end of a small piece of blue litmus paper into well 2 and record any colour change (i.e. did it turn red?).
5. Dip the end of a small piece of universal litmus paper into well 3 and record both the colour and pH reading (refer to the pH scale that accompanies the paper).
6. Place 1-2 drops of phenolphthalein (PPT) indicator in well 1 and record any colour change (i.e. did it turn pink?).
7. Place 1-2 drops of bromothymol blue (BTB) indicator in well 2 and record any colour change (i.e. did it turn yellow?).
8. Place a small amount of baking soda into well 3 and record if any reaction occurs (i.e. did it bubble?).
9. Place a small piece of magnesium into well 4 and record if any reaction occurs (i.e. did it bubble?).
10. Rinse out your spotting tray and then repeat steps 2 to 9 for NaOH, H₂O, and the 4 unknown samples.

NOTE: Avoid cross-contamination of dropper bottles and solutions; let the solutions "free-fall" into the microtray wells rather than touching the dropper bottle to the microtray.

Observations

SEE SECOND SHEET

Conclusion

11. Using the results of this lab, create a chart that summarizes the properties of acids and bases.

Analysis

(Be sure to use full sentences, particularly when it asks you to explain, discuss, describe, ...)

- {8} 1. Classify the unknown solutions as either an acid, a base or neutral. Explain your classification.
- {3} 2. Describe how an acid, such as HCl, and a base, such as NaOH, can be identified from their chemical formulas.
- {3} 3. If you were only allowed to use one indicator to identify an unknown solution as acidic, basic, or neutral, which indicator would you use? Explain your choice.
- {4} 4. Universal litmus and phenolphthalein are commercial indicators while cabbage juice and tea are natural indicators. Explain these terms.
- {3} 5. A property of acids is that they taste sour. A property of bases is that they feel slippery. Would you use either of these properties in a lab to identify an unknown substance? Why or why not?
- {3} 6. Carbonic acid is found in pop. Why do you think metal pop cans are lined with a plastic coating? Explain your reasoning.

MARKING SCHEME

• Date, Title, Name	/1
• Question	/1
• Materials	/1
• Method	/1
• Observations	/10
• Conclusion	/6
• Analysis	/24
• Spelling/Grammar	/3
• Form	/3
TOTAL	/50

OBSERVATIONS

		SAMPLE (✓ = yes , ✗ = no)						
		HCl (hydrochloric acid) (acid)	NaOH (sodium hydroxide) (base)	H ₂ O (water) (neutral)	#1 (unknown)	#2 (unknown)	#3 (unknown)	#4 (unknown)
INDICATOR	Red Litmus Paper (Well 1 - turned blue?)							
	Blue Litmus Paper (Well 2 - turned red?)							
	Universal Litmus Paper (Well 3 - colour & pH Value)							
	Phenolphthalein or PPT (clear liquid) (Well 1 - turned pink?)							
	Bromothymol Blue or BTB (blue liquid) (Well 2 - turned yellow?)							
	Baking Soda (Well 3 - bubbled?)							
	Magnesium Metal (Well 4 - bubbled?)							