Acidic, Basic, and Neutral

A. Fill in the Blanks

Complete the sentences with the correct word.

1. The reaction between an acid and a base is called _____.
2. Bases have a _____ taste and a slippery feel.
3. A substance with a pH less than 7 is known as an _____.
4. The pH scale is a measure of how acidic or basic a substance is, ranging from ____ to ____.
5. Acids react with certain metals to produce _____ gas.

B. Match the Following;

Match the example in Column A with the best description in Column B.

Column A	Column B
1. Acid	A. Turns red litmus paper blue
2. Base	B. pH of 7
3. Neutral	C. Lemon juice, vinegar
4. Litmus	D. The products are salt and water
5. pH 1	E. An indicator to test for acids/bases
6. pH 13	F. A very strong acid
7. Neutralization	G. A very strong base

C. Practice Problems

Apply your knowledge to solve these problems.

1. List two properties of acids and two properties of bases.
   - Acids: _____, _____
   - Bases: _____, _____
2. Classify the following substances as Acidic, Basic, or Neutral:
   - Soap: _____
   - Orange Juice: _____
   - Baking Soda Solution: _____
   - Table Salt mixed in water: _____

- Stomach Acid: _____

3. What is a chemical indicator? Give an example.

4. Explain what happens during a neutralization reaction. What are the two main products?

5. A substance turns red litmus paper blue and feels slippery to the touch. What can you conclude about this substance?

6. Why is it dangerous to taste or touch an unknown chemical in the science lab to identify it?

7. Place the following items on the pH scale below: Battery Acid (pH 1), Pure Water (pH 7), Bleach (pH 13).

   (Acidic) 0 --- 1 --- 2 --- 3 --- 4 --- 5 --- 6 --- 7 --- 8 --- 9 --- 10 --- 11 --- 12 --- 13 --- 14 (Basic)

8. What is the pH scale used for?

9. Turmeric is a natural indicator. It is yellow in acidic and neutral solutions but turns red in basic solutions. What color would a soap stain turn on a white shirt if you rubbed it with turmeric paste?

10. What are the products when hydrochloric acid (an acid) reacts with sodium hydroxide (a base)?

D. Warm-up Questions

Answer these quick questions to get your brain warmed up!

1. What is the taste commonly associated with acidic substances like lemons?

2. What is the pH value of pure, distilled water?

3. Give one example of a basic substance you might find in your home.

4. If you dip blue litmus paper into vinegar, what color will it turn?

5. Is a substance with a pH of 12 considered acidic, basic, or neutral?

E. Challenge Questions

Think critically to answer these more difficult questions.

1. A student has a solution with a pH of 2. If they add a large amount of pure water to it, what will happen to the pH? Will it increase, decrease, or stay the same? Explain your answer.

2. Design a simple experiment to determine if an unknown clear liquid is an acid, a base, or neutral. List the materials you would need and the steps you would take.

3. Rainwater is naturally slightly acidic (pH around 5.6). What causes this? How is this different from "acid rain"?

4. A student mixes a strong acid (pH 2) with a strong base (pH 12) in equal amounts. What would you expect the approximate pH of the final mixture to be? Explain the process that occurs.

5. Phenolphthalein is an indicator that is colorless in acidic solutions and pink in basic solutions. You have a beaker of a basic solution with phenolphthalein in it, so it is pink. You slowly add an acid. Describe what you would observe and why.

F. Word Problems & Application

Connect your knowledge to real-world scenarios.

1. A farmer finds that their soil is too acidic for their crops to grow well. What type of substance (acidic, basic, or neutral) should they add to the soil to fix the problem? Give an example of such a substance.
2. A person suffering from indigestion has too much acid in their stomach. An antacid tablet gives them relief. Is the antacid tablet acidic or basic? Explain how it works.
3. A bee sting is acidic. To soothe the pain, it is often recommended to apply a paste of baking soda and water. Why is this an effective remedy?
4. You are cleaning the terminals on a car battery and notice a white, crusty corrosion, which is caused by sulfuric acid leaking. Your friend suggests using a baking soda solution to clean it. Is this a good idea? Why or why not?
5. Many cleaning products for greasy stovetops are basic (alkaline). Why is a base effective at cleaning up greasy and oily spills, which are often composed of fatty acids?

G. True or False

1. A substance with a pH of 8 is slightly acidic. _____
2. Adding an acid to a base makes the base stronger. _____
3. Pure water is a perfect example of a neutral substance. _____
4. All acids are dangerous and will burn your skin. _____
5. Litmus paper is a type of base. _____