

Shedding Light on Acids and Bases Episode 4: pH Name: _____

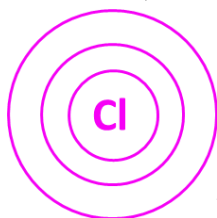
Part B Part A

1. The _____ scale (lower case ____, capital ____) is used to express the strength of an acid or a base.
2. The atomic number of an atom tells you the number of _____ in the atom's nucleus, which is the same as the number of _____ that move around the nucleus.
3. Complete the electron-configuration diagrams for a hydrogen atom and a chlorine atom.

Hydrogen, H

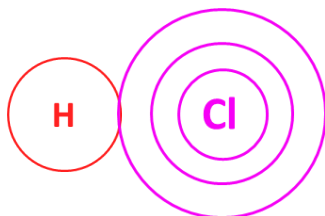


Chlorine, Cl



Electron Configuration: ____, ____, ____

4. A _____ bond forms when atoms attract each other's electrons into their own shells. When a hydrogen atom and a chlorine atom form a covalent bond, the chlorine atom ends up with _____ electrons in its outer shell, and the hydrogen atom ends up with _____ electrons in its outer shell.
5. Draw in the electrons on the diagram of the HCl molecule below.

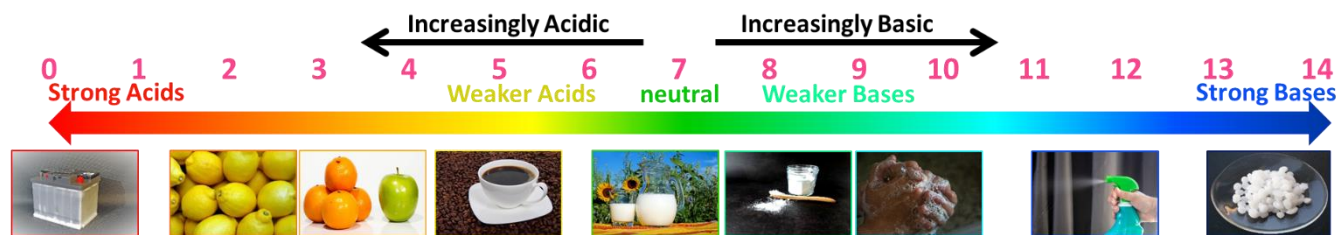


6. What is an ion? _____
7. When HCl dissolves in water, hydrogen ions and chloride ions form. A chloride ion has _____ protons, but _____ electrons, so it has an overall charge of _____.
8. What is a H^+ ion? _____
9. An acid is a chemical that, when dissolved in water, produces _____ ions.
10. Hydrochloric acid (HCl) is a strong acid, but acetic acid (CH_3COOH), the acid in vinegar, is a weak acid. What causes this difference? _____

Part C

11. When a base dissolves in water, _____ ions are produced.
12. Write the equation (in symbols) for the dissociation of sodium hydroxide in water. _____
13. Write the equation (in symbols) for the dissociation of bi-carb soda in water. _____
14. Sodium hydroxide is a strong base but bi-carb soda is a weak base. What is the difference? _____

15. Pure water has a pH of _____. Strong acids have a pH of about _____. Strong bases have a pH of about _____.



16. Lemons have a lower/higher pH than apples (and oranges), which means that they are more/less acidic than apples and that a cup of lemon juice has more/less H^+ ions than a cup of apple juice.
17. Milk has a pH of about 6.6. What does this say about the amount of H^+ ions in milk? _____

18. Soap has a higher/lower pH than bi-carb soda which means that there are more/less OH^- ions present (in a given volume).

19. A beaker contains hydrochloric acid with a pH of about 1.5. If sodium hydrogen carbonate (a base) is added to the beaker, what will happen to the pH of the mixture in the beaker? Explain.

20. Clean, natural rain water has a pH of about 6. Acid rain has a higher/lower pH.
21. The chart below shows the tolerance that trout, bass, perch, and frogs have to acid rain. Which of the animals is most sensitive to changes in the pH of rivers and lakes and which of the animals is most resilient to changes in pH? Explain your answer.

pH 4.0	pH 4.5	pH 5.0	pH 5.5	pH 6.0	pH 6.5	
						Trout
						Bass
						Perch
						Frogs

22. Most plants grow best in soils that have a pH of between about _____ and _____.
23. If I want to plant some tomatoes and find that my soil has a pH of 8, what can I do to improve the soil? Explain why. _____

24. A farmer finds that the soil on her farm has a pH of 5.5. Why is this a problem and what can she do about it? _____

