

WEEK #4 **NOTE:** You may choose to complete this assignment on MobyMax using a cell phone.

DAY #1 - DIRECTIONS: Read each passage and complete the activities after each.

Chemical properties of matter describe the ways a substance reacts with another substance. In a chemistry lab, it is very important for scientists to know the chemical properties of substances. Mixing substances without knowing how they will react might cause harm to the lab equipment or the people in the lab. For example, most substances do not react with water. However, mixing pure potassium and water can create a violent explosion!

Chemical properties also help scientists identify unknown substances when they are combined under safe conditions. For example, if a scientist needed to identify a solid, she might add a drop of water to its surface. If the water bubbles, sizzles, or evaporates, the scientist can rule out every substance that is not supposed to react with water. However, no one should mix unknown substances without help from a teacher or scientist. Substances react with other substances. The ways in which they react are called chemical properties.

Chemical properties describe the way a substance _____.

Gene is a fifth grader. He found some unmarked bottles under his bathroom sink. He wants to find out what they are. Should he mix them together?

- yes, because mixing unknown substances is very safe
- yes, because mixing unknown substances can help him figure out what the bottles contain
- no, because mixing unknown substances could be very dangerous
- no, because Gene does not know how to mix the substances safely

Gene should not mix the unknown substances together. They could create a harmful reaction that could start a fire, make Gene sick, or create another dangerous situation.

Circle the person who can safely combine unknown substances to test their chemical properties:



Even though the police officer is an adult, he should not mix unknown substances without the help of a scientist in a lab. The little girl and the baby should never mix unknown substances without the help of a teacher or scientist.

Flammability and corrosion are two kinds of chemical properties. Flammability and corrosion are chemical properties because substances must react with each other for them to occur. Density and volume are both physical properties.

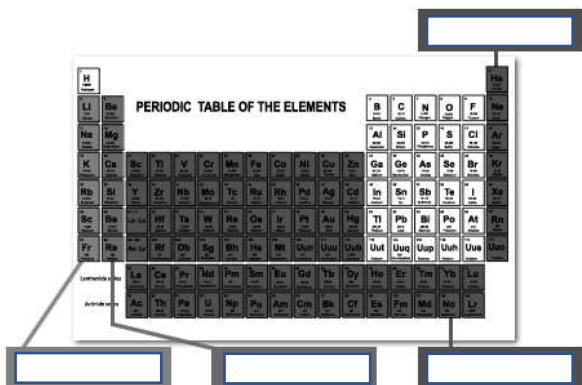


Which of the following are chemical properties?

- density
- volume
- corrosion
- flammability

Flammable materials burn. Corrosion, such as rusting, breaks down metal. Think of an example from your life when you have encountered a flammable or corrosive material. How could you tell?

The periodic table helps us learn more about the way elements react, or how quickly they experience a chemical reaction. The periodic table is divided into sections that group elements with similar chemical properties.



Label the groups on this periodic table with the 4 names in the left column. Then connect the group with the right column description.

- NOBLE GASES
- ALKALI METALS
- TRANSITION METALS
- ALKALINE EARTH METALS

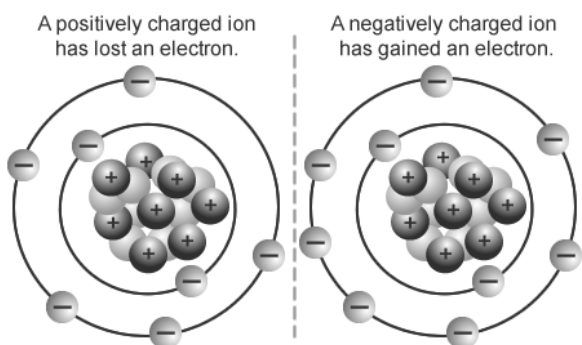
- VERY STABLE
- REACT SLOWLY
- MILDLY REACTIVE
- VERY REACTIVE

The noble gases rarely react with other elements, so they are very stable. The alkali metals are not stable and will quickly react with other elements; they are very reactive. The alkaline earth metals will also react mildly with other elements. The transition metals will react with other elements, but they will react more slowly than the alkali metals or alkaline earth metals. Noble gases, like helium, are very stable. They do not react easily. Rh, or rhodium, is in the transition metals group. This means that it reacts slowly. Hydrogen is a very reactive substance, so it is more likely to catch on fire or cause an explosion. Helium is very stable, so it is safer to use a large amount of it to transport people in the air. It is very unlikely that helium would catch fire or cause an explosion.

Helium is a noble gas. That means it is _____.

A long time ago, blimps were filled with hydrogen to make them float in order to carry passengers. However, this was dangerous because hydrogen is very reactive and can explode easily. Now, blimps are filled with helium, a noble gas. Why do you think it is safer to use helium instead of hydrogen?

Chemical properties help categorize elements, molecules, and compounds. Some chemical properties are influenced by ions. Ions are atoms that have lost or gained an electron. Losing or gaining electrons causes ions to become charged. Losing an electron gives the particle a positive charge. Gaining an electron gives the particle a negative charge.



These are oxygen atoms because they have 8 protons in their nuclei. However, they have different numbers of electrons. This gives them a charge, which makes them ions. When atoms lose or gain an electron, they become charged. Charged particles are called ions. Hydrogen ions create charges that make a substance more acidic or more basic.

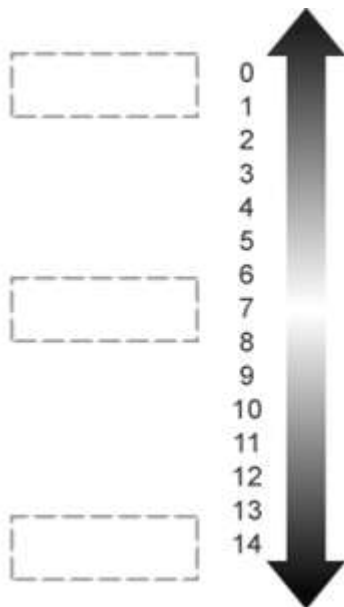
Ions of which element help determine whether a substance is an acid or a base? _____

Acidic substances have an excess of, or too many, hydrogen ions. Basic substances have a lack of, or too few, hydrogen ions. Bases, like bleach, have a lack of hydrogen ions. Acids, like lemon juice, have an excess of hydrogen ions.

Bases _____ hydrogen ions. Acids _____ hydrogen ions.

DAY #2 – DIRECTIONS: Read each passage and complete the activities after each.

How can we tell whether a substance is an acid or a base? Litmus paper and the pH scale are two useful ways to measure this information. Acidic substances have a pH below 7. Bases have a pH above 7. Neutral substances have a pH of 7. The lower the pH the more acidic.



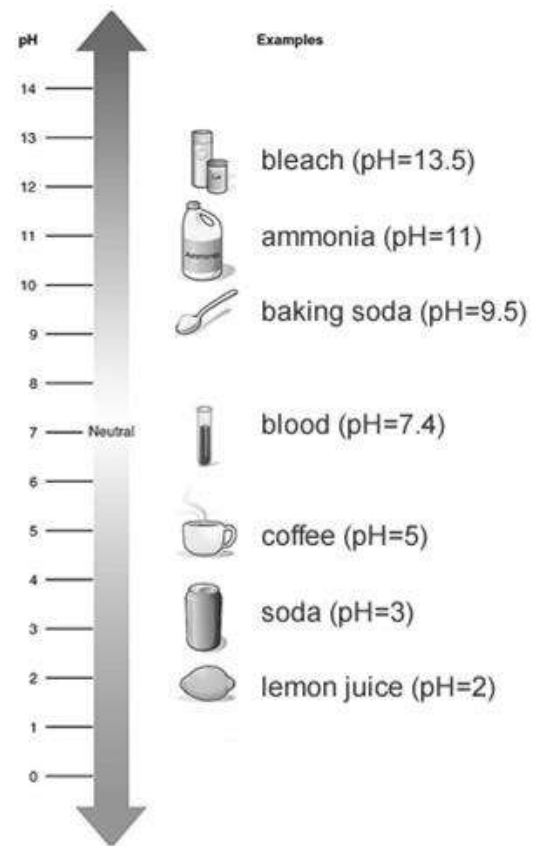
←Correctly label this pH scale:

ACIDIC
BASIC
NEUTRAL

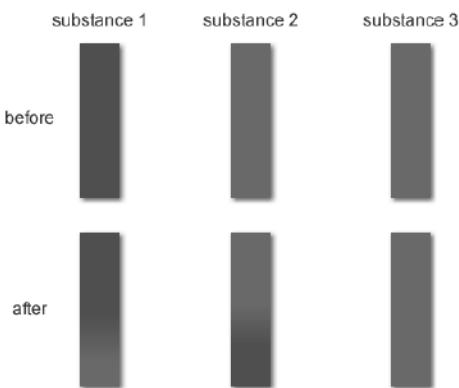
Looking at the pH scale on the right, which household substance is the MOST acidic?

Which is the closest to neutral?

Which substance is the MOST basic?



Dr. Link is testing the pH of three unknown substances with litmus paper strips. He dips the bottom of each strip into the substances. Acids turn blue litmus paper red. This means that substance 1 is basic. Bases turn red litmus paper blue. This means that substance 2 is acidic. Substance 3 did not change the litmus paper. This means that substance 3 could either be basic or neutral. (NOTE: You can see this image in full color on MobyMax assignment, slide #27) Which of the following are true based on the litmus results below?



- Substance 1 is acidic.
- Substance 2 is acidic.
- Substance 3 is acidic.
- Substance 1 is basic.
- Substance 2 is basic.
- Substance 3 is basic.
- Substance 3 is neutral.

If neither the red nor the blue litmus paper change when it was dipped into a substance it is neutral. This means that substance 3 must be neutral, or have a pH of about 7.

DAY #3 – DIRECTIONS: Read each passage and complete the activities after each.

If acids have a positive charge and bases have a negative charge, do the opposites ever attract each other, like magnets? Yes! When certain elements combine due to their opposite charges, a solid is formed called a salt. A salt is a brittle substance made from the ions. Water is also formed in this reaction. When an acid and a base combine to create a salt and water, this process is called neutralization. Ordinary table salt is made up of a sodium ion with a positive charge (Na+) and a chlorine ion with a negative charge (Cl-). The two ions bind together to form NaCl, which has a neutral charge. Water is also produced in this

process. There are also many other types of salts that are produced in this way. When formed, some salts are solids, and some are dissolved in the water produced by the reaction.

Which of the following combine to create a salt?

- a negatively charged base
- a neutral base
- a neutral acid
- a positively charged acid
- a positively charged base
- a negatively charged acid

Acids have positive charges, and bases have negative charges. These charges cause the atoms to combine and create salts. Neutralization happens when an acid and a base combine and create a salt and water. The salt is made up of ions from the acid and the base. To form a salt, the acidic lemon juice must combine with a base. The bleach is basic. The soda is acidic, and the water is neutral. Soda and water will not create a salt when combined with lemon juice.

Use TWO of these terms to correctly fill in the blanks: LITMUS PAPER, A BASE, WATER, AN ACID, A SALT or pH SCALE

During neutralization, acids and bases combine to create _____ from ions. In addition, _____ is formed from this process.



bleach cleaner



soda



pure water

Which of these substances would create a salt when combined with lemon juice?

To form a salt, the acidic lemon juice must combine with a base. The bleach is basic. The soda is acidic, and the water is neutral. Soda and water will not create a salt when combined with lemon juice.

DAY #4 DIRECTIONS: Review Days 1-3 by marking all the correct answers.

What is a chemical property?

- one way a substance reacts when it sits alone
- something that can be observed with just the five senses
- a solid that forms when certain elements combine due to their opposite charges
- one way a substance reacts with another

What is flammability?

- when metals react with the environment and wear away
- the ability for a substance to form a salt
- the color of a substance
- the ability for a substance to burn

When does corrosion happen?

- when metals react with one another to create a new substance
- when a substance is left alone
- when an acid and a base combine to create a salt and water
- when metals react with the environment and wear away

What are alkali metals?

- substances that react slowly
- very stable substances that do not react easily
- mildly reactive substances
- very reactive substances

What are alkaline earth metals?

- very reactive substances
- substances that react slowly
- very stable substances that do not react easily
- mildly reactive substances

What are transition metals?

- substances that only react with metals
- substances that react slowly
- substances that only react with themselves
- very stable substances that do not react easily

What are noble gases?

- very stable substances that do not react easily
- very flammable gases
- substances that create salts when they react
- gases that sometimes react quickly and sometimes do not react quickly

What is an acid?

- a compound without hydrogen ions
- a compound with extra hydrogen ions
- a compound with too much salt in it
- a compound with too few hydrogen ions

What is a base?

- a compound with too few hydrogen ions
- a compound with too much salt in it
- a compound with extra hydrogen ions
- a compound without hydrogen ions

When does neutralization happen?

- when an acid and a base combine to create a salt and water
- when a base is left alone
- when metals react with the environment and wear away
- when an acid is left alone

What is a salt?

- a solid that forms when a substance burns
- a solid that forms when bases sit alone
- a solid that forms when acids sit alone
- a solid that forms when certain elements combine due to their opposite charges

Dr. Link has noticed that an unknown substance in his lab catches on fire. Which of the following are chemical properties of this substance?

- acidity
- flammability
- corrosion
- mass

Alkali metals are very reactive substances. Alkaline earth metals are mildly reactive substances. Transition metals react slowly. Noble gases are very stable substances. Acids have too many hydrogen ions, which gives them a positive charge. Bases have too few hydrogen ions, which gives them a negative charge.

Acids have _____ hydrogen ions, which gives them a _____ charge. Bases have _____ hydrogen ions, which gives them a _____ charge.

What happens if an acid and a base are combined?

- neutralization
- the formation of ions
- the formation of water
- the formation of a salt

Chemical properties are based on _____.

- how substances look
- how substances feel
- how substances react
- how substances smell

Chemical reactions should be performed _____.

- only with help from a 3rd grader
- by anyone who wants to learn more
- by anyone who has found unknown substances
- only with help from a teacher or scientist

Dr. Link is testing unknown substances and learns that one of the substances wears away metal. Which of the following properties describes this unknown substance?

- corrosive
- litmus
- flammable
- dense

Which of the following are groups of the periodic table?

Check all that are true.

- transition metals
- alkali metals
- alkaline earth metals
- noble gases

Neon and helium are elements that are very stable and do not react easily with other elements. Which group do they belong to?

- transition metals
- alkali metals
- alkaline earth metals
- noble gases

Which pair of words fits best in the blanks: _____ are compounds with an excess of hydrogen ions.

_____ are compounds with a lack of hydrogen ions.

- Ions; Bases
- Acids; Ions
- Bases; Acids
- Acids; Bases

What allows acids and bases to bond with each other?

Check all that are true.

- the acid's positive charge
- the base's neutral charge
- the base's negative charge
- the acid's negative charge

A salt and water form _____.

Check all that are true.

- during a litmus test
- when they become flammable
- when acids and bases combine
- during neutralization

THIS PACKET (as well as any others) MUST BE TURNED IN ON MAY 14th FOR CREDIT.

WEEK #5 Assignment is a survey that needs to be completed online. Nothing will be turned into the school. The link was sent to the email listed in AERIES. Please complete the survey by Friday, May 22nd. Thank you!