

Seventh Grade “Chemical Bonds and Reactions” Assessment

- 1a. To get a stable outer shell of _____, atoms will either gain, lose or share them.
- 1b. What will atoms do in order to have a stable outer electron shell?
- gain electrons
 - lose electrons
 - share electrons
 - all of the above
- 1c. What can atoms do in order to achieve a stable outer electron shell? Give an example of each case you list.
- _____
- _____
- _____
- _____
- 2a. In a chemical reaction, atoms are _____.
- lost
 - rearranged
- 2b. In a chemical _____, atoms of compounds and elements are rearranged.
- 2c. Discuss the possibilities of what may happen to the compounds and elements involved in a chemical reaction. Give an example.
- _____
- _____
- _____
- _____
- 3a. Two or more atoms bonded together is called a _____.
- molecule
 - mixture
- 3b. Two or more atoms of the same element bonded together are called _____.
- 3c. Describe the differences and similarities between molecules and compounds.
- _____
- _____
- _____
- 4a. O₂ is an example of a _____ of oxygen.
- molecule
 - atom
- 4b. O₂ is an example of a(n) _____ of _____.

4c. Give an example of a molecule containing only one element:

5a. NaCl can be called two things. What are its names?

- a. an element and a mixture
- b. a compound and a molecule

5b. What are the two possible classifications of NaCl?

- a. a compound and a molecule
- b. a family and a group
- c. an element and a mixture
- d. a class and a molecule

5c. Why can NaCl be classified as both a compound and a molecule?

6a. What happens during an ionic bond?

- a. One atom gives electrons away, one atom gains electrons.
- b. Two atoms share their electrons.

6b. What happens to the electrons during an ionic bond?

6c. Give an example of a compound with an ionic bond and tell specifically what happens with the electrons involved.

7a. An atom with only two valence electrons will _____ them both.

- a. lose
- b. keep

7b. An atom with only one, two or three valence electrons will probably _____ them.

7c. Why are the Family I and II elements called highly reactive metals?

- 8a. Give an example of a compound with an ionic bond: _____
- 8b. Give an example of an ionic bond and tell which element loses electron(s) and which gains electron(s):

- 8c. Tell which families or groups of elements will join together in an ionic compound, and give two specific examples with the details of what happens with the valence electrons in each.

- 9a. Which bond involves many atoms sharing their electrons in a very loose way?
a. ionic
b. metallic
- 9b. Which bond involves many atoms sharing their electrons in a very loose way?

- 9c. How does the metallic bond work?

- 10a. Because the atoms in a metallic bond can move around each other freely, metals can be _____ when pounded with a hammer.
a. shattered
b. shaped
- 10b. Because the atoms in a metallic bond can move around each other freely, when you pound a pure metal with a hammer, what happens to it? _____
- 10c. Discuss the properties of pure metals that can be explained by the loose electron and atom arrangement in metallic bonds.

- 11a. Which type of bond has atoms sharing electrons in a very definite way?
a. covalent
b. ionic

11b. Which type of bond involves two or more atoms sharing electrons in a very specific pattern? _____

11c. What do the valence electrons involved in a covalent bond do?

12a. An example of a covalently bonded molecule is:

- a. NaCl
- b. O₂

12b. Give an example of a covalently bonded molecule: _____

12c. Give an example of a covalently bonded molecule and tell how many electrons each atom brings to the molecule and what happens to them.

13a. The element _____ is called the basis of life.

13b. Which element with four electrons is very versatile and contained in most molecules contained in living things? _____

13c. Which element is called the basis of life? Why is it called this?

14a. A reaction where oxygen is added is called _____.

- a. calcification
- b. oxidation

14b. During an oxidation reaction:

- a. oxygen is taken away
- b. neutrons are lost
- c. neutrons are gained
- d. oxygen is added

- 14c. During an oxidation reaction, the oxidized element:
- a. loses oxygen
 - b. loses electrons
 - c. gains oxygen
 - d. gains electrons

Choose the correct choice(s) and then explain the correct and incorrect choices:

- 15a. Iron rusting is an example of _____.
- a. oxidation
 - b. synthesis

15b. Give an example of oxidation: _____

15c. Give an example of oxidation and show the chemical equation that matches.

16a. The opposite of reduction is _____.

16b. When a compound reduces, it _____ oxygen.

16c. Explain the differences between oxidation and reduction.

- 17a. Vinegar is an _____.
- a. acid
 - b. base

17b. Give an example of an acid: _____

17c. Give two examples of acids:

- 1. _____
- 2. _____

18a. _____ taste sour.

- a. Bases
- b. Acids

- 18b. How do acids taste?
a. sweet
b. sour
c. bitter
d. salty
- 18c. Acidic substances have what distinctive taste? _____
- 19a. Acids turn blue litmus paper _____.
- 19b. Acids turn _____ litmus paper _____.
- 19c. What affects do acids have on litmus paper?

- 20a. Baking soda is a(n) _____.
a. acid
b. base
- 20b. Write an example of a base: _____
- 20c. Give two examples of bases:
1. _____
2. _____
- 21a. _____ taste bitter.
a. Bases
b. Acids
- 21b. How do bases taste?
a. sweet
b. sour
c. bitter
d. salty
- 21c. Bases have what distinctive taste? _____
- 22a. Bases turn red litmus paper _____.
- 22b. Bases turn _____ litmus paper _____.
- 22c. What affects do bases have on litmus paper?

- 23a. Neutral on the pH scale is _____.
- 0
 - 7
- 23b. Neutral on the pH scale is _____.
- 0
 - 4
 - 7
 - 14
- 23c. What number on the pH scale is neutral? _____
- 24a. If a substance has a pH of 3, it is _____.
- an acid
 - a base
- 24b. If a substance has a pH of 3, it is _____.
- an acid
 - a base
 - neutral
 - none of the above
- 24c. A substance with a pH of 3 is a(n) _____.
- 25a. If a substance has a pH of 12, it is _____.
- an acid
 - a base
- 25b. If a substance has a pH of 12, it is _____.
- an acid
 - a base
 - neutral
 - none of the above
- 25c. A substance with a pH of 12 is a(n) _____.
- 26a. In water, an acid has _____ H^+ ions.
- many
 - no
- 26b. In water, an acid has extra _____ ions.

26c. Give the chemical definition of an acid.

27a. In water, a base has _____ OH^- ions.

- a. many
- b. no

27b. In water, a base has extra _____ ions.

27c. Give the chemical definition of a base.

28a. When an acid and a base come together, they make _____ and water.

28b. When an acid and a base react, they form _____ and _____.

28c. Show the chemical equation and explain the reaction between an acid and a base.

29a. A shorter way to write and explain chemical reactions is with a(n) _____.

- a. sentence
- b. equation

29b. Scientists use a short-hand version to give details of chemical reactions. What is it called? _____

29c. A _____ is a shorter way to write chemical reactions.

30a. A _____ will help a chemical reaction, but not get involved.

- a. catalyst
- b. product

30b. A _____ will speed up a chemical reaction while not becoming involved in the reaction itself.

30c. Give details of how a catalyst can affect a chemical reaction.

The following Colorado Model Content Standards are addressed in this assessment by the questions indicated:

Questions 7c, 8c, 10c, 18a, 18b, 18c, 19a, 19b, 19c, 21a, 21b, 21c, 22a, 22b, 22c, 30a, 30b, 30c: Standard 1. Students understand the processes of scientific investigation and design, conduct, communicate about, and evaluate such investigations.

Questions 1a, 1b, 1c, 2a, 2b, 2c, 3a, 3b, 3c, 4a, 4b, 4c, 5a, 5b, 5c, 6a, 6b, 6c, 7a, 7b, 7c, 8a, 8b, 8c, 9a, 9b, 9c, 10a, 10b, 10c, 11a, 11b, 11c, 12a, 12b, 12c, 13a, 13b, 13c, 14a, 14b, 14c, 15a, 15b, 15c, 16a, 16b, 16c, 17a, 17b, 17c, 18a, 18b, 18c, 19a, 19b, 19c, 20a, 20b, 20c, 21a, 21b, 21c, 22a, 22b, 22c, 23a, 23b, 23c, 24a, 24b, 24c, 25a, 25b, 25c, 26a, 26b, 26c, 27a, 27b, 27c, 28a, 28b, 28c, 30a, 30b, 30c: Standard 2. Physical Science: Students know and understand common properties, forms, and changes in matter and energy.

Questions 3a, 3b, 3c, 13a, 13b, 13c: Standard 3. Life Science: Students know and understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment.

Questions 5a, 5b, 5c, 7c, 8a, 8b, 8c, 9c, 10a, 10b, 10c, 13a, 13b, 13c, 14a, 14b, 14c, 15a, 15b, 15c, 29a, 29b, 29c: Standard 4. Earth and Space Science: Students know and understand the processes and interactions of Earth's systems and the structure and dynamics of Earth and other objects in space.

Questions 2a, 2b, 2c, 3a, 3b, 3c, 13a, 13b, 13c: Standard 6. Students understand that science involves a particular way of knowing and understand common connections among scientific disciplines.

Answer Key

- 1a. electrons
1b. d. all of the above
1c. Acceptable answers could include:
-They may gain, lose or share electrons.
-Possible examples: an atom with 6 outer electrons may gain 2, one with only 1 outer electron may lose it, and an atom with 4 may share with another with 4.
- 2a. b. rearranged
2b. Reactions
2c. Acceptable answers could include:
-the atoms in the compounds and elements may switch places or rearrange
-Examples will vary.
- 3a. a. molecule
3b. Molecule
3c. Acceptable answers could include:
-Both: two or more atoms held together by bonds. Compounds can also be called molecules.
-Molecules- often formed from only one element, with covalent or metallic bonds
-Compound- form from more than one element, usually with ionic bonds.
- 4a. a. molecule
4b. molecule, oxygen
4c. Acceptable answers could include:
-O₂, N₂, etc.
- 5a. b. a compound and a molecule
5b. a. a compound and a molecule
5c. Acceptable answers could include:
-It is a molecule because it is two atoms joined together.
-It is a compound because it has an ionic bond.
- 6a. a. One atom gives electrons away, one atom gains electrons.
6b. Acceptable answers could include:
-One atom loses electrons, and the other gains them.
6c. Acceptable answers could include:
-a metal and a nonmetal, with the metal losing electrons and the nonmetal gaining
-Make sure they gain and lose the correct number of valence electrons.
- 7a. a. lose
7b. Lose
7c. Acceptable answers could include:
-Group I and II have only one and two valence electrons, and so lose them quite easily and often, making them react with almost any nonmetal they come in contact with.

- 8a. Acceptable answers could include:
-table salt
- 8b. Acceptable answers could include:
-the metal must lose e^- and the nonmetal must gain e^-
- 8c. Acceptable answers could include:
-Group I and II will lose electrons most commonly to Group 6 and 7 elements. Examples will vary.
- 9a. b. Metallic
- 9b. Metallic
- 9c. Acceptable answers could include:
-Groups of metallic elements share their few and loose valence electrons with each other, creating a “sea” of electrons around the entire sample. The atoms and molecules all can move freely around each other.
- 10a. b. shaped
- 10b. Shaped or smooshed without shattering.
- 10c. Acceptable answers could include:
-Metals are malleable and ductile: they can be shaped by hammering or pulled into wires because their atoms are not locked into place in a metallic bond, since all of the atoms share all of the valence electrons.
- 11a. a. covalent
- 11b. covalent
- 11c. Acceptable answers could include:
-The atoms in covalently bonded molecules share the valence molecules they have among some or all of the atoms in the molecule. There are still not enough for all the atoms to have 8 valence electrons of their own, but the electrons travel around all of them, splitting time between them all.
- 12a. b. O_2
- 12b. Answers will vary according to class discussions and work.
- 12c. Answers will vary according to class discussions and work.
- 13a. Carbon
- 13b. Carbon
- 13c. Acceptable answers could include:
-Carbon, almost all molecules in living things contain Carbon. Carbon based molecules are called organic.
- 14a. b. oxidation
- 14b. d. oxygen is needed
- 14c. Acceptable answers could include:
-B and C. Explanations will vary, but may include that choices A and D are examples of reduction

- 15a. a. oxidation
15b. Answers will vary according to class discussions and work.
15c. Answers will vary according to class discussions and work.
- 16a. Oxidation
16b. Loses
16c. Acceptable answers could include:
-Should include details of how oxidation and reduction are opposites of each other.
- 17a. a. acid
17b. Acceptable answers could include:
-something containing H
17c. Acceptable answers could include:
- should contain H
- 18a. b. Acids
18b. b. sour
18c. sour
- 19a. red
19b. blue, red
19c. Blue litmus paper will turn red
- 20a. b. base
20b. Acceptable answers could include:
-should contain OH
20c. Acceptable answers could include:
-should contain OH
- 21a. a. Bases
21b. c. bitter
21c. Bitter
- 22a. blue
22b. red, blue
22c. Acceptable answers could include:
-Red litmus paper will turn blue.
- 23a. b. 7
23b. c. 7
23c. 7
- 24a. a. an acid
24b. a. an acid
24c. Acid

25a. b. a base

25b. b. a base

25c. Base

26a. a. many

26b. H^+ or hydrogen

26c. Acceptable answers could include:

-In a water solution, an acid will contain hydrogen ions.

27a. a. many

27b. OH^- or hydroxide

27c. Acceptable answers could include:

-In a water solution, a base will contain hydroxide ions.

28a. Salt

28b. Salt, water

28c. Answers will vary but must take this form:

acid + base \rightarrow salt + water with explanation

29a. b. equation

29b. chemical equation

29c. chemical equation

30a. a. catalyst

30b. catalyst

30c. Acceptable answers could include:

-A catalyst will either help start or speed up a chemical reaction, usually by lowering the activation energy of the reaction.