

Structure and Properties of Matter Unit Review Guide

I. Write the scientific term for each of the following definitions:

1. The smallest particle of a given element that retains an elements chemical properties.
(_____)
2. The process by which a substance is able to change from one state to another. (_____)
3. The temperature at which a solid becomes a liquid. (_____)
4. Molecules which contain different types of atoms. (_____)
5. The negatively charged particle found outside the nucleus of an atom. (_____)
6. The subatomic particle which has no charge/is neutral (_____)
7. The number of protons contained in an atom (_____)
8. Variations of the same element which have the same number of protons but differ in their number of neutrons.(_____)
9. Differing distances from the nucleus of an atom which are occupied by electrons. (_____)
10. The number of protons and neutrons contained in the nucleus of an atom. (_____)
11. Electrons found in the outermost energy level of an atom. (_____)
12. A positively charged ion (_____)
13. A negatively charged ion (_____)
14. The vertical columns found in the periodic table (_____)
15. The horizontal rows in the periodic table. (_____)

II. Multiple Choice: Select the letter which best finishes the statement.

1. The atomic number of the element chlorine is:

- | | |
|-------|-------|
| a) 6 | c) 20 |
| b) 17 | d) 27 |

2. The number of electrons found in the element sodium is:

- | | |
|-------|-------|
| a) 11 | c) 16 |
| b) 14 | d) 21 |

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3. Magnesium forms a _____ ion:
 - a) Positive 1
 - b) Positive 2
 - c) Negative 1
 - d) Negative 2

4. Oxygen forms a _____ ion.
 - a) Positive 1
 - b) Positive 2
 - c) Negative 1
 - d) Negative 2

5. The number of carbon atoms found in 2 molecules of glucose ($C_6H_{12}O_6$) is:
 - a) 6
 - b) 12
 - c) 24
 - d) 48

6. _____ refers to the tendency of atoms to prefer eight electrons in their outer most shell.
 - a) Electronegativity
 - b) Octet rule
 - c) Valency
 - d) Orbital notation

7. $1s^2 2s^2 2p^5$ is the orbital notation for:
 - a) Oxygen
 - b) Fluorine
 - c) Carbon
 - d) Nitrogen

8. The element with the smallest atomic radius is:
 - a) Oxygen
 - b) Boron
 - c) Carbon
 - d) Nitrogen

9. The element with the strongest metallic character is:
 - a) Lithium
 - b) Sodium
 - c) Potassium
 - d) Rubidium

10. The element with the highest level of electronegativity is:
 - a) Oxygen
 - b) Sulfur
 - c) Carbon
 - d) Nitrogen

III. Give one difference between:

1. Metals and non-metals.

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2. Protium, deuterium and tritium isotopes.

3. Anions and Cations.

4. Evaporation and condensation.

5. Thomson's model of the atom and Rutherford's model.

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IV. Draw the orbital notation diagram for sodium.

V. Outline valence electron numbers across a period versus down a group in the periodic table. Use and example from the periodic table to illustrate your answer.

VI. Match the beginning of the statement in column A with its correct ending in column B.

Column A	Column B
1. When energy is supplied to a substance...	A. the particles move at a slower rate.
2. A change in state occurs when...	B. bonds in a substance are either broken or new ones are formed.
3. When energy is removed from a substance...	C. the particles are able to move about more freely
4. Particles in a gas move faster than in a liquid or solid because...	D. they have a greater amount of kinetic energy.

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VII. What is a semi-metal? How do they differ from metals and non-metals?

VIII. Match the ion from (Column A) with its correct symbol in (Column B).

Column A	Column B
1. Fluoride	A. Al^{+3}
2. Sodium	B. S^{-2}
3. Oxide	C. Na^{+1}
4. Sulfide	D. F^{-1}
5. Aluminum	E. O^{-2}

IX. Explain how an atom becomes an ion. How do different types of ions form?
