Student name:\_\_\_\_\_\_\_\_\_\_

**TRUE/FALSE - Write 'T' if the statement is true and 'F' if the statement is false.**

1. When applying the scientific method, it is important to avoid any form of hypothesis.
* true
* false
1. The mass of a neutron is equal to the mass of a proton plus the mass of an electron.
* true
* false
1. Almost all the mass of an atom is concentrated in the nucleus.
* true
* false
1. Copper (Cu) is a transition metal.
* true
* false
1. Lead (Pb) is a main group element.
* true
* false
1. Each shell (principal energy level) of quantum number n contains n subshells.
* true
* false
1. For all atoms of the same element, the 2 s orbital is larger than the 1 s orbital.
* true
* false
1. Matter is anything that has mass and occupies space.
* true
* false
1. The rusting of a piece of iron under environmental conditions is a physical change.
* true
* false
1. A scoop of vanilla ice cream is a pure substance.
* true
* false
1. The juice from an orange is a mixture.
* true
* false
1. 0 K < 0°F < 0°C
* true
* false
1. Ethanol (C2H5–OH) will have a greater viscosity than ethylene glycol (HO–CH2CH2–OH) at the same temperature.
* true
* false
1. At equilibrium, the rate of the forward reaction is equal to the rate of the reverse reaction.
* true
* false

|  |
| --- |
| When the following reaction is at equilibrium |
| 2NOCl(*g*) %media:chapter15a\_3.jpg% 2NO(*g*) + Cl2(*g*)  then [NO]2 [Cl2] = *K*[NOCl]2.  |

* true
* false

|  |
| --- |
| The equilibrium constant expression for the reaction |
| CuO( *s*) + H2( *g*) %media:chapter15a\_3.jpg% Cu( *s*) + H2O( *g*) is *K* = [H2]/[H2O]. |

* true
* false
1. If the system 3H2( g) + N2( g)2NH3( g) is at equilibrium and more N2 is added, a net reaction that consumes some of the added N2 will occur until a new equilibrium is reached.
* true
* false
1. When a reaction system reaches equilibrium, the forward and reverse reactions stop.
* true
* false

**MULTIPLE CHOICE - Choose the one alternative that best completes the statement or answers the question.**

1. What is a unifying principle that explains a body of experimental observations?

law

hypothesis

theory

phenomena

prediction

1. What is the term used for findings that are summarized based on a pattern or trend?

law

hypothesis

theory

phenomena

prediction

1. Which of the following is an example of an observation?

Gases expand as their temperature increases because the gas molecules are moving more rapidly.

Paraffin wax begins to melt at 57°C.

Three samples of wax are heated to 75°C.

The force acting on an object is equal to its mass times its acceleration.

Will all waxes melt at the same temperature?

1. Which of these scientists developed the nuclear model of the atom?

John Dalton

Robert Millikan

J. J. Thomson

Henry Moseley

Ernest Rutherford

1. Rutherford's experiment with alpha particle scattering by gold foil established that

protons are not evenly distributed throughout an atom.

electrons have a negative charge.

electrons have a positive charge.

atoms are made of protons, neutrons, and electrons.

protons are 1840 times heavier than electrons.

1. Who is credited with discovering the atomic nucleus?

Dalton

Gay-Lussac

Thomson

Chadwick

Rutherford

1. Rutherford bombarded gold foil with alpha (α) particles and found that a small percentage of the particles were deflected. Which of the following was not accounted for by the model he proposed for the structure of the atom?

the small size of the nucleus

the charge on the nucleus

the total mass of the atom

the existence of protons

the presence of electrons outside the nucleus

1. Which one of the following statements about atoms and subatomic particles is correct?

Rutherford discovered the atomic nucleus by bombarding gold foil with electrons.

The proton and the neutron have identical masses.

The neutron's mass is equal to that of a proton plus an electron.

A neutral atom contains equal numbers of protons and electrons.

An atomic nucleus contains equal numbers of protons and neutrons.

1. What is the term for the number of protons in the nucleus of each atom of an element? It also indicates the number of electrons in the atom.

isotope number

mass number

mass-to-charge ratio

atomic number

atomic mass units

1. The elements in a column of the periodic table are known as

metalloids.

a period.

noble gases.

a group.

nonmetals.

1. Which of the following is a nonmetal?

Lithium, Li, *Z* = 3

Bromine, Br, *Z* = 35

Mercury, Hg, *Z* = 80

Bismuth, Bi, *Z* = 83

Sodium, Na, *Z* = 11

1. Which of the following is a metal?

Nitrogen, N, *Z* = 7

Phosphorus, P, *Z* = 15

Arsenic, As, Z = 33

Thallium, Tl, *Z* = 81

Silicon, Si, *Z* = 14

1. Which of the following is a metalloid?

Carbon, C, *Z* = 6

Sulfur, S, *Z* = 16

Germanium, Ge, *Z* = 32

Iridium, Ir, Z = 77

Bromine, Br, *Z* = 35

1. A row of the periodic table is called a(n)

group.

period.

isotopic mixture.

family.

subshell.

1. In the periodic table, atoms are arranged in order of

increasing atomic mass.

increasing atomic number.

physical properties.

periodicity.

chemical reactivities.

1. The elements in Group 7A are known by what name?

transition metals

halogens

alkali metals

alkaline earth metals

noble gases

1. The elements in Group 2A are known by what name?

transition metals

halogens

alkali metals

alkaline earth metals

noble gases

1. The alkali metal elements are found in \_\_\_\_\_\_\_ of the periodic table.

Group 1A

Group 2A

Group 3A

Period 7

Period 1

1. Which element would be expected to have properties similar to calcium?

Ba

K

Sc

Na

Rb

1. Which element would be expected to have properties similar to argon?

F

Cl

H

Br

Kr

1. Which element would be expected to have properties similar to antimony?

Se

Sn

P

As

Pb

1. What elements and groups have properties that are most similar to those of chlorine?

F, Br, I, and nonmetals in Group 7A

Cl, K, C, and metals in Group 1B

N, P, As, and lanthanides

He, Ne, Xe, and nonmetals in Group 7A

O, S, and P

1. Which of these elements exhibits chemical behavior similar to that of potassium?

Magnesium

Sodium

Sulfur

Chlorine

Iron

1. Which of these elements exhibits chemical behavior similar to that of oxygen?

Magnesium

Sodium

Sulfur

Chlorine

Iron

1. Which of these elements exhibits chemical behavior similar to that of silver?

Nickel

Gold

Sulfur

Chlorine

Iron

1. In what groups are transition metals located?

1A, 7A, and 1B

2A, 4A, and 7A

1B through 8B

2B and 3B through 6B

3A through 6A

1. Which one of these elements is a transition element?

Sr

Pb

As

Fe

H

1. Which one of these elements is a transition element?

Nickel

Tin

Sodium

Sulfur

Calcium

1. Which of these elements is chemically similar to magnesium?

Sulfur

Calcium

Iron

Nickel

Potassium

1. Which of these elements is chemically similar to oxygen?

Sulfur

Calcium

Iron

Nickel

Potassium

1. Which of these elements is chemically similar to potassium?

Calcium

Arsenic

Phosphorus

Cerium

Cesium

1. <p>What element is represented by X in the atomic symbol notation?</p>

Iridium

Platinum

Palladium

Selenium

Magnesium

1. Determine the number of electrons and identify the correct symbol for an atom with 17 protons and 18 neutrons.

<p>17 electrons,

18 electrons,

17 electrons,

17 electrons,

18 electrons,

1. Determine the number of protons, electrons, and neutrons for the isotope gold-197. The symbol for gold is Au.

118 protons, 118 electrons, 79 neutrons

79 protons, 79 electrons, 118 neutrons

79 protons, 79 electrons, 39 neutrons

118 protons, 118 electrons, 39 neutrons

79 protons, 39 electrons, 118 neutrons

1. Determine the number of protons and identify the correct symbol for an atom with 20 neutrons and 20 electrons.

20 protons,

20 protons,

20 protons,

40 protons,

40 protons,

1. C(graphite) and C(diamond) are examples of

isotopes of carbon.

allotropes of carbon.

the law of definite proportions.

different carbon ions.

1. <p>Bromine is the only nonmetal that is a liquid at room temperature. Consider the isotope bromine-81,. Select the combination which lists the correct atomic number, number of neutrons, and mass number, respectively.</p>

35, 46, 81

35, 81, 46

81, 46, 35

46, 81, 35

35, 81, 116

1. Atoms X, Y, Z, and R have the following nuclear compositions:

|  |  |  |  |
| --- | --- | --- | --- |
| %media:formula2.mml% | %media:formula3.mml% | %media:formula4.mml% | %media:formula5.mml% |
|  **I**  |  **II**  |  **III**  |  **IV**  |

 Which of the following are isotopes of the same element?

I and II

I and IV

II and IV

III and IV

I and III

1. Which isotope is *not* possible?









All of these isotopes are possible.

1. Atoms of the same element with different mass numbers are called

Ions.

Neutrons.

chemical groups.

chemical families.

Isotopes.