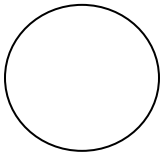
Chemistry Unit Test 1 2014-2015 Review

Name:_____

S8P1a. Students will distinguish between atoms and molecules.

1. Which of the following particles combine to form molecules?
   a. Atoms
   b. Protons
   c. Electrons
   d. Compounds

2. The picture to the right represents



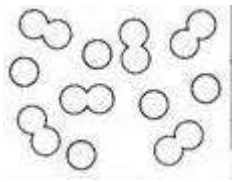
   a. An atom.
   b. A molecule.
   c. A mixture.
   d. A compound.

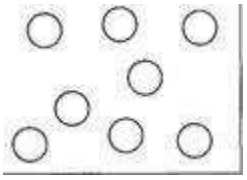
S8P1b. Students will describe the difference between pure substances (elements and compounds) and mixtures.

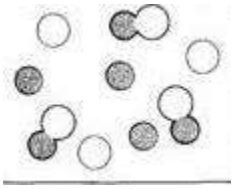
3. A solution in a dish contains 3.0 grams of salt dissolved in 100 grams of water. If 50 grams of water evaporate, the solution is
   a. A compound.
   b. A mixture.
   c. An element.
   d. A solid.

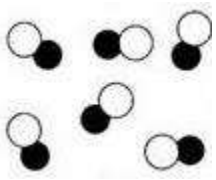
4. The air you breathe is
    a. An element.
    b. A compound.
    c. A mixture.
    d. An isotope.

5. Which of the following pictures represents an element?

a. 

b. 

c. 

d. 

S8P1 d. Distinguish between physical and chemical properties of matter as physical

6. A group of students were asked to identify three white powders. The students used physical and chemical properties to identify the powders. They computed the density of each powder. They checked to see if any dissolved in water. One of the powders did not dissolve in water and they thought it was cornstarch. They knew that cornstarch felt slippery and reacted with iodine. The students put a few drops of iodine on each powder. One powder turned black; it was definitely cornstarch. Another powder, baking soda, reacted with vinegar. It fizzed and the test tube got hot. Which of these is an observed chemical property?
    a. Color of the powders.
    b. Density of the powders.
    c. A powder dissolves in water.
    d. A powder reacts with vinegar.

7. Silver is a white metal that is an excellent conductor of heat and electricity. The density of silver is 10.49 g/cm^3. Silver does not react with water but does react with nitric acid. Silver tarnishes when exposed to air. A physical property of silver is
    a. Silver reacts with nitric acid.
    b. Silver has a density of 10.49 g/cm^3.
    c. Silver tarnishes when exposed to air.
    d. Silver does not react with water.

8. Which of the following is a physical property?
    a. Milk going sour.
    b. Rusting nail.
    c. Boiling Point.
    d. Reacts with air.

9. Which of the following is a chemical property?
   a. Will neutralize an acid.
   b. Eating cupcakes.
   c. Belching.
   d. Shiny.

S8P1 e. Distinguish between changes in matter as physical or chemical.

10. During science lab, some students added small pieces of magnesium (Mg) to hydrochloric acid (HCl). They noticed that bubbles formed, the test tube got hot, and the magnesium disappeared. Which of the following is a sign that a chemical change has taken place in this experiment?
    a. A new odor appeared.
    b. Formation of a gas.
    c. Decrease in temperature.
    d. Formation of a precipitate.

11. Which of the following is a physical change?
    a. Stretches longer.
    b. Will go sour in minutes.
    c. Sodium reacting with water.
    d. Sugar dehydrated by sulfuric acid.

12. Elizabeth holds a stick in a fire until it burns. The stick burning is an example of a
    a. Physical property.
    b. Chemical property.
    c. Physical change.
    d. Chemical change.

13. A chemical change for a piece of metal would be
    a. Being bent in half.
    b. Getting cut into two pieces.
    c. Being painted green on one side.
    d. Getting rusty when left outside.

S8P1 f. Recognize that there are more than 100 elements and some have similar properties as shown on the Periodic Table of Elements.

14. Sodium gives off heat and forms hydrogen gas when it is mixed with water. Which of the following would be expected to react in a similar way?
    a. Magnesium (Mg)
    b. Chlorine (Cl)
    c. Calcium (Ca)
    d. Cesium (Cs)

15. NASA sent out a probe to collect a sample from a comet. They wanted to bring the sample back to Earth but did not want to contaminate the sample. What might they use to store the sample in for its trip back to Earth?
    a. Oxygen (O)
    b. Nitrogen (N)
    c. Argon (Ar)
    d. Mercury (Hg)

16. Which element would be the best to use in thermostats where you would need a good conductor but also one that could flow freely?
    a. Bromine (Br)
    b. Oxygen (O)
    c. Copper (Cu)
    d. Mercury (Hg)

SPS1a. Examine the structure of the atom in terms of

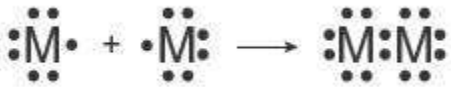
- **Proton, electron, and neutron locations.**
- **Atomic mass and atomic number.**
- **Atoms with different numbers of neutrons (isotopes).**
- **Explain the relationship of the proton number to the element's identity.**

Use the Periodic Table of the Elements for the table below.

Symbol	Name	Atomic #	#Protons	#Neutrons	#Electrons	Mass	Charge
V^{+5}	17.	18.	19.	20.	21.	22.	+5
23.	24.	25.	19	26.	27.	39	+1
Pd^{+4}	28.	29.	30.	60	31.	32.	33.

SPS1b. Compare and contrast ionic and covalent bonds in terms of electron movement.

34. The illustration below shows two atoms of a fictitious element (M) forming a diatomic molecule.

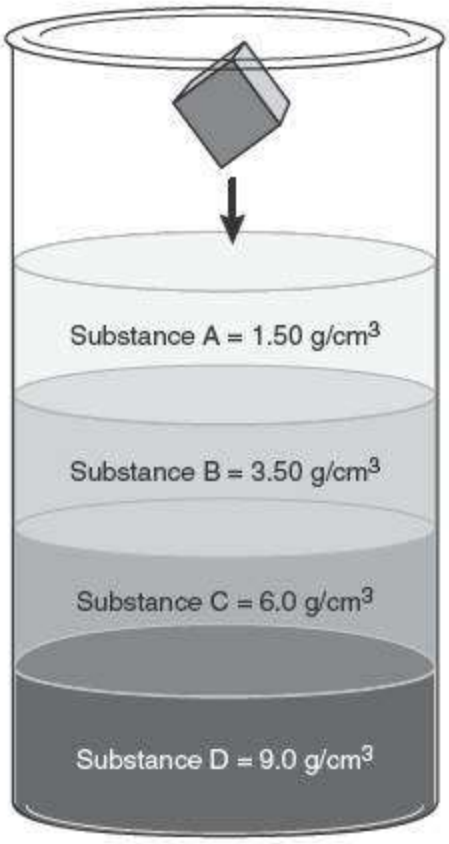


What type of bonding occurs between these two atoms?

a. covalent
b. ionic
c. nuclear
d. polar

SPS2 a. Calculate density when given a means to determine a substance's mass and volume.

35. A solid cube was put into a cylinder containing four liquids with different densities as shown to the right. The cube fell quickly through layer A, fell slowly through layer B, and stopped upon reaching layer C. The density of the cube most likely falls between



a. 1.00 and 1.50 g/cm^3.
b. 1.51 and 3.50 g/cm^3.
c. 3.51 and 6.00 g/cm^3.
d. 6.00 and 9.00 g/cm^3.

36. We have an object with a density of 620 g/cm^3 and a volume of 75 cm^3. What is the mass of this object?
    a. 46,500 g
    b. 0.121 g
    c. 8.3 g
    d. 75 g

37. A graduated cylinder has 22 mL of water placed in it. An irregularly shaped rock is then placed in the graduated cylinder and the volume of the rock and water in the graduated cylinder now reads 30 mL. The mass of the rock is 24 g. What is the density of the rock?
    a. 0.8 g/mL
    b. 8 g/mL
    c. 3 g/ml
    d. 0.33 g/mL

38. What volume of silver metal will weigh exactly 2500.0 g. The density of silver is 10.5 g/cm^3.
    a. 26,250 cm^3
    b. 0.0042 cm^3
    c. 238.1 cm^3
    d. 13.8 cm^3

SPS2b. Predict formulas for stable binary ionic compounds based on balance of charges.

Write the correct formula for the following ions

39. Ca^{+2}, PO_4^{-3} _____

40. Fe^{+3}, O^{-2} _____

41. Na^{+1}, Cl^{-1} _____

SPS2c. Use IUPAC nomenclature for transition between chemical names and chemical formulas of

- **Binary ionic compounds (containing representative elements).**
- **Binary covalent compounds (i.e. carbon dioxide, carbon tetrachloride).**

<u>If given the name, write the formula. If given the formula, write the name.</u>

42. $MgCl_2$ _____

43. CCl_4 _____

44. Sodium phosphate _____

45. Iron (III) oxide _____

Answers and Explanations

1. Atoms (a) are the correct answer. Protons and electrons make up atoms. Compounds are a collection of molecules that are the same.

2. The correct answer is (a). Atoms are pictured as single items. A molecule would be two circles stuck together. A mixture is what it sounds like, a bunch of stuff thrown together. A compound, as mentioned above, is a collection of molecules that are all the same.

3. The correct answer is (b). The two are just mixed together and can be separated by mechanical means (in this case evaporation). An element would appear on the Periodic Table. A compound is described above. A solid is not even close to the correct answer.

4. The air is a mixture (c). It contains oxygen, nitrogen, carbon dioxide, water vapor, dust, and a lot of other stuff. That makes it a mixture. Compounds and elements have been described above. An isotope is an atom with more or less neutrons than the average number shown on the Periodic Table.

5. The correct choice is (b). It shows all of the objects are singles and exact copies of one another. Choice (d) is a compound as it shows two bonded together and all of the molecules look alike. Choices (a) and (c) are mixtures. You can see molecules and atoms in each.

6. The correct answer is (d). Chemical properties describe possible interactions. They can be likened to describing a person's personality.

7. The correct answer is (b). Physical properties describe using the senses or measurement.

8. The correct answer is (c). Boiling Point is a measurement of when a substance goes from a liquid state to a gas state. Measurement means physical property.

9. The correct answer is (a). Future tense is one give away of a property. Neutralizing acid is an interaction. That makes this a chemical property.

10. Choice (b) is the correct answer. The fizzing is the formation of a gas. All the others are indicators of a chemical change but not in this experiment.

11. Choice (a) is the answer. In physical changes the substance's identity does not change. A rubber band does not stop being rubber because you stretch it.

12. The correct choice is (c). An action verb like burning indicates a change. When the stick is burned it is no longer wood but ash and escaped gases. This indicates a chemical change. Chemical changes are when substances become new things.

13. The correct answer is (d). A rusty piece of metal has very different properties to one that isn't rusted. The many different properties means the substance is no longer what it started out as.

14. Elements with similar properties are in the same column, also known as groups or families. To find the answer, look on the Periodic Table and find the one in the same column as sodium. The answer is (d).

15. The correct answer would be (c). Argon is a Noble Gas. The Noble Gases are known for being inert also known as non-reactive.

16. The correct answer is (d). Metals are good conductors and the only one at room temperature that also flows (liquid) is mercury.

For 17-33 there is a video on my website that explains how to do this table.

Symbol	Name	Atomic #	#Protons	#Neutrons	#Electrons	Mass	Charge
V^{+5}	17. Vanadium ion	18. 23	19. 23	20. 51 – 23 = 28	21. 23 – 5 = 18	22. 51	+5
23. K^{+1}	24. Potassium ion	25. 19	19	26. 39 – 19 = 20	27. 19 – 1 = 18	39	+1
Pd^{+4}	28. Palladium ion	29. 46	30. 46	60	31. 46 – 4 = 42	32. 46 + 60 = 106	33. +4

34. The correct answer is (a). The electrons are shared making this a covalent bond. An ionic bond would have electrons moving from one atom to the other and the atoms staying separated with one becoming positive and one becoming negative.

35. The correct answer is (c). More dense things sink and less dense things float. Since the cube sank in layer B and stopped at layer C it must have a density more than layer B but less than layer C.

36. Use the formula Density = Mass/Volume. Plug in 620 for density and 75 for volume. Use one step equation solving from algebra and you will see that the answer is 620 * 75 = 46,500. That is answer (a).

37. First you have to find the volume of the rock. You do this by taking the volume of the water and rock and subtracting the volume of the water so 30 – 22 = 8. Next use the formula that Density = Mass/Volume. D=24/8 = 3. Answer C.

38. Again, you would use the formula that Density = mass/volume. Substitute in the numbers and do a little one step algebra and you get 2500.0/10.5 = 238.1 which is answer C.

For #39-45 there are videos on my website which explain things in detail.

39. The answer is $Ca_3(PO_4)_2$

40. The answer is Fe_2O_3

41. The Answer is NaCl

42. There is a metal so I use the ionic naming conventions. There is no transition metal so I do not use Roman Numerals to indicate charge. The answer is Magnesium chloride.

43. There are no metals so I use the covalent conventions, which means the prefixes. There is one Carbon. The prefix Mono- is rarely used for the first element in the name. There are four Chlorine atoms so I need the tetra- prefix. The name is Carbon tetra chloride.

44. Sodium has the symbol Na and forms the Na^{+1} ion. Phosphate is the polyatomic that is PO_4^{-3} ion. This creates the formula Na_3PO_4.

45. Iron has the symbol Fe and the Roman Numeral 3 tells me that this iron atom forms the +3 ion. Oxygen always forms a -2 ion. The formula you get is Fe_2O_3.