

Solutions to Unit 4 Practice Test

1. Molecular because both elements are nonmetals.
2. FeBr_2 , iron II bromide It is ionic because it contains a metal and a nonmetal.
3. MgO magnesium oxide Ionic same as #2
4. No compound will form, both elements are metals and neither one will accept electrons to form a compound.
5. CaH_2 calcium hydride Ionic same as #2
6. K_3N potassium nitride ionic same as #2
7. Li_2SO_4 lithium sulfate ionic same as #2
8. AgCl silver chloride ionic same as #2
9. NH_4Cl ammonium chloride ionic because it contains a positive ion (NH_4^{+1}) as well as a negative ion.
10. Sr_3P_2 strontium phosphide ionic same as #2
11. $\text{Mn}(\text{SO}_3)_2$ manganese (IV) sulfite ionic same as #2
12. ZnF_2 zinc fluoride ionic same as #2

13. Ionic Bonds – are formed when one atom gives electrons away (forming a positive ion) to another atom (which forms a negative ion). The 2 ions are held to each other by the attractive force between positive and negative charges.

Metallic Bonds -- are formed because metal atoms will always tend to give away their valence electrons, leaving positively charged metal ions surrounded by free electrons. The positively charged metal ions are held together by their attraction to the free electrons.

14. Solutions of ionic compound will conduct electricity because when ionic compounds are dissolved in water, the individual ions separate and are able to move freely in the solution and carry charge. In a solid ionic compound, the ions are not free to move and thus, cannot carry the charge.

15. Metals are good conductors of electricity, because metallic bonds consist of positive metal ions surrounded by free moving electrons. These free moving electrons can carry electrical charge which means that the substance can conduct electricity.

16. Molecular substances are formed when elements bond to each other by sharing electrons in covalent bonds. Since no electrons are transferred in a covalent bond, none of the atoms in a molecular compound have a charge. If there are no charges present in molecular compounds they cannot conduct electricity since conducting electricity requires charges to move.

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| 17. water | 18. dinitrogen pentoxide | 19. sulfur dioxide | 20. acetic acid |
| 21. nitrogen trioxide | 22. vanadium V oxide | 23. phosphorus trihydride | 24. carbon disulfide |

25.

- a. 26 protons and 23 electrons.
- b. No compound will form because both elements would like to give away their electrons.
- c. No compound will form for the same reasons as **b**.

26. Chemical compounds have very different chemical and physical properties from the elements from they were formed because when elements form compounds, they either give, take or share electrons, resulting in a different arrangement of valence electrons from the elements. Since the valence electrons determine the chemical properties of a substance, having a different valence electron configuration would result in different properties.

27. Distilled water is pure water. It does not have any ionic compounds dissolved in it. Since water is a molecular compound, all of its particles or molecules are electrically neutral and therefore cannot carry a charge.

28.

a. If tap water will conduct electricity, it must have ions dissolved in it because charged particles are necessary to carry the electrical charge.

b. Vegetable oil must be a molecular compound because if it were an ionic compound then it would conduct electricity as a liquid.

c. Soy sauce must contain ionic compounds if it will conduct electricity. The salty taste of soy sauce means that these ions probably come from sodium chloride.

d. Tap water will conduct electricity for reasons explained in part a. If you are using your hair dryer while standing in a tub of water, it is possible for electric current from your hair dryer to travel through your body and through the water to the drain pipe, which is connected to the earth. Electric current will always try to flow toward the earth. If electric current is allowed to flow through your body, you will be electrocuted and could die from this.

e. Plastic must be a molecular compound because it does not conduct electricity and it is malleable. Not conducting electricity as a solid means that it is not a metal and being flexible and malleable means that it could not be an ionic compound since ionic compounds are brittle. Therefore, it must be a molecular compound.

29. An **atom** is the smallest particle of an element and is electrically neutral. A molecule is a group of atoms that makes up the smallest particle of a compound and is electrically neutral. An ion is either an atom or a group of atoms that has an electrical charge because it has either gained or lost electrons.