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IONIC AND METALLIC BONDING

Chem 512 Homework

Print this sheet, answer the questions and turn it in as a **HARD COPY**

A. Matching

Match each description in Column B with the correct term in Column A. Write the letter of the correct description on the line.

Column A

Column B

- | | |
|---------------------------------|--|
| _____ 1. electron dot structure | a. a mixture of two or more elements, at least one of which is a metal |
| _____ 2. ionic compound | b. the number of ions of opposite charge surrounding each ion in a crystal |
| _____ 3. valence electron | c. the force of attraction binding oppositely charged ions together |
| _____ 4. ionic bond | d. the attraction of valence electrons for positive metal ions |
| _____ 5. chemical formula | e. a depiction of valence electrons around the symbol of an element |
| _____ 6. halide ion | f. compound of cations and anions |
| _____ 7. alloy | g. an anion of a halogen |
| _____ 8. octet rule | h. an electron in the highest occupied energy level of an atom |
| _____ 9. formula unit | i. Atoms in most compounds tend to achieve the electron configuration of a noble gas. |
| _____ 10. coordination number | j. shows the kinds and numbers of atoms in the smallest representative unit of a substance |
| _____ 11. metallic bond | k. lowest whole-number ratio of ions in an ionic compound |

B. Multiple Choice

Choose the best answer and write its letter on the line.

- _____ 12. How many valence electrons does an atom of any element in Group 6A have?
- | | |
|------|------|
| a. 2 | c. 6 |
| b. 4 | d. 8 |

- _____ 13. The electron dot structure for an atom of phosphorus is
- | | |
|--|--|
| a. $\cdot \overset{\cdot}{\underset{\cdot}{\text{P}}} \cdot$ | c. $\cdot \text{P} \cdot$ |
| b. $\cdot \underset{\cdot}{\overset{\cdot}{\text{P}}} \cdot$ | d. $\overset{\cdot}{\underset{\cdot}{\text{P}}} \cdot$ |

C. True-False

Classify each of these statements as always true, AT; sometimes true, ST; or never true, NT.

- _____ 24. The chemical properties of an element are largely determined by the number of valence electrons the element has.
- _____ 25. Fluorine and chlorine each have one valence electron.
- _____ 26. The coordination number gives the total number of ions in a crystal.
- _____ 27. Atoms acquire the stable electron structure of a noble gas by losing electrons.
- _____ 28. An alloy is a mixture of two or more elements, of which at least one is a metal.
- _____ 29. The crystal structure of ionic compounds such as sodium chloride is very unstable.
- _____ 30. When melted, ionic compounds conduct electricity.
- _____ 31. Metals are ductile because the cations in a piece of pure metal are insulated from one another by a sea of electrons.
- _____ 32. Metal atoms are arranged in a face-centered cubic structure.
- _____ 33. During the formation of ionic compounds, electrons are transferred from one atom to another.

D. Questions

Answer the following in the space provided.

34. Write electron dot structures for the atoms and ions of each of the following elements.

Atoms

Ions

a. Ca

b. Br

c. Al

35. Write the formulas obtained when each of these atoms loses or gains valence electrons and becomes anion. Tell whether each is a cation or an anion.

a. Cl _____

c. Na _____

b. Be _____

d. O _____

36. Write the complete electron configurations for the ions in problem 35.

a.

b.

c.

d.

37. Use electron dot structures to predict the structure of the ionic compound composed of aluminum and chlorine.

