Test Design

Overview

The following quiz was created for a Chemistry I class, to be administered following a unit on bonding and molecular structure.

Three targeted learning objectives for the exam are:

1) Comparing and contrasting bonding types (ionic or covalent) and their properties and
2) Predicting bond strength and type
3) Use periodic trends of electronegativity to determine bond type and strength

Sources for the items included:

http://hyperphysics.phy-astr.gsu.edu/hbase/chemical/bond.html
http://www.science.uwaterloo.ca/~cchieh/cact/c120/bondel.html

Bonding and Molecular Structure Exam

1) Match each bonding type on the left with its description on the right. Each response on the left may be used once. *(Popham: Matching items. Bloom: Remembering). Scoring= 1 pt @ 4 total=4 points.*

__D__ Metallic — A) Atoms have an unequal sharing of electrons.

___C__ Covalent — B) One atom loses electrons and the other gains electrons.

___A__ Polar Covalent — C) Atoms share one or more valence electrons.

__B___ Ionic — D) Positive ions in a sea of electrons.

E) Involves carbon multiple bonds.

2) As a rule, when the ___electronegativity____ between two atoms is greater than 1.8, the bond is assumed to be ionic. *(Popham: Short Answer. Bloom: Remembering). Scoring=4 points.*

3) The energy required to break a mole of bonds is called the ____bond energy_____ *(Popham: Short Answer. Bloom: Remembering). Scoring= 4 points.*

4) Circle the answer: True or False. Electronegativity increases up and across the Periodic Table. *(Popham: Multiple Binary Choice. Bloom: Knowing). Scoring= 2 points.*

5) Using electronegativity trends, what kind of bond would you predict CO form? *(Popham: Multiple Binary Choice. Bloom: Evaluation). Scoring= 2 points.*

a. Covalent
b. Polar Covalent

6) Using electronegativity trends, what kind of bond would you predict AlF form*? (Popham: Multiple Binary Choice. Bloom: Evaluation). Scoring= 2 points.*

a. Metallic
b. Ionic

7) Using electronegativity trends, what kind of bond would you predict KBr form? *(Popham: Multiple Binary Choice. Bloom: Evaluate). Scoring= 2 points.*

a. Ionic
b. Covalent

8) Using periodic trends, which bond is predicted to have the highest bond energy? *(Popham: Multiple Choice. Bloom: Evaluation). Scoring= 4 points.*

a. H-H
b. H-O
c. H-F
d. H-I

9) Which bond has the lowest predicted bond energy? *(Popham: Multiple Choice. Bloom: Evaluation). Scoring= 4 points.*

a. H-H
b. H-O
c. H-F
d. H-I

10) In four or five sentences, compare and contrast the covalent and ionic bond properties using at least three features of each of the bonds. *(Popham: Essay. Bloom: Analysis)*
Scoring= 12 points possible, 2 pts for each feature for each type of bond.

Responses could include covalent bonds have low polarity, whereas ionic bonds have high polarity. Covalent bonds are formed between two nonmetal atoms that have similar electronegativities and share electrons. Ionic bonds are formed by a metal and a nonmetal. Covalent bonds have low melting and boiling points, ionic bonds have high melting and boiling points. Covalent bonds are liquids or gases at room temperature and ionic compounds are solid at room temperature.

Total points= 40 points