Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Assignment: Bond Type and Intermolecular Forces

1. Match the following:

|  |  |  |
| --- | --- | --- |
| **Answer (write the letter)** | **Term** | **Definition** |
|  | 1. Ionic Bond | 1. single unpaired valence electrons |
|  | 1. Covalent Bond | 1. temporary attraction between induced dipoles- only attraction in non-polar molecules |
|  | 1. Electronegativity | 1. unequal sharing of electrons |
|  | 1. Polar Covalent Bond | 1. attraction between positive and negative ions |
|  | 1. Non-polar Covalent Bond | 1. attraction between polar molecules |
|  | 1. Dipole-Dipole Attraction | 1. equal sharing of electrons |
|  | 1. London Dispersion force | 1. bond when electrons are shared |
|  | 1. Bonding Electrons | 1. a quantitative measure of attraction for electrons |
|  | 1. Lone pair electrons | 1. paired valence electrons |

1. The combination of elements which is most likely to form an ionic bond is:
2. O and F
3. K and O
4. F and Cl
5. Cl and Kr
6. Molecular dipole results from
7. atoms in a molecule having the same electronegativity
8. a charge separation in the molecule
9. the bonding electrons being equally distributed
10. equal sharing of the bonding electrons
11. If a carbon atom is to become the negative end of a bond dipole, it must be bonded to an atom of:
12. phosphorus
13. nitrogen
14. chlorine
15. oxygen
16. The covalent bond between the two carbons in the molecule C2H2 contains how many pairs of bonding electrons?
17. 1
18. 2
19. 3
20. 4
21. A bond formed between two oxygen atoms (O2) will be
22. ionic
23. metallic
24. polar covalent
25. non-polar covalent
26. The non-polar molecule listed below is:
27. BF3
28. NF3
29. SiO2
30. CH2Cl2
31. In a bond between carbon and oxygen in the molecule CH3O,
32. carbon will be the positive ion
33. oxygen will be the positive ion
34. oxygen will be the positive end of the dipole
35. carbon will be the positive end of the dipole
36. The molecule that exhibits hydrogen bonding is:
37. H2
38. H2S
39. C2H6
40. CH3CH2OH
41. The situation that does **NOT** involve intermolecular bonding is
42. the sulfur atom in an H2S molecule attracting the hydrogen atoms
43. the hydrogen atom of H2O attracting the oxygen atom of CH3OH
44. forces of attraction holding molecules of H2O together in ice
45. methane molecules attracting methane molecules
46. Oxygen and sulphur belong to the same group in the periodic table and each element bonds with hydrogen. Water, H2O, exists as a liquid at room temperature (boiling point 100oC). Dihydrogen sulphide, H2S, is a gas at room temperature (boiling point -62oC). This is due
    1. stronger London dispersion forces in water
    2. stronger covalent bonding in water
    3. hydrogen bonding in water
    4. ionic bonding in water
47. Which one of the following is the weakest intermolecular force?
    1. ionic bonding
    2. hydrogen bonding
    3. London dispersion forces
    4. dipole-dipole attraction
48. Which one of the following gases will boil at the lowest temperature?
    1. hydrogen (H2)
    2. ammonia (NH3)
    3. carbon dioxide (CO2)
    4. hydrogen sulphide (H2S)
49. Which one of the following compounds is polar?
    1. BF3
    2. CH4
    3. CSe2
    4. NH3
50. What is the correct order of bond polarity of the bonds F – F, H – F, and O – F, beginning with the least polar?
    1. F – F, O – F, H – F
    2. F – F, H – F, O – F
    3. H – F, O – F, F – F
    4. H – F, F – F, O – F
51. Which of the following molecules has a zero dipole moment?
    1. BF3
    2. NH3
    3. H2O
    4. CHCl3

*Use the following information to answer the next question.*

The electronegativity values of four hypothetical elements in the same period of the periodic table are listed below:

P Q R S

3.0 2.1 3.3 3.9

These elements belong to groups 13, 15, 16, 17, but not in that order.

1. Which of these hypothetical elements belongs to group 16?
   1. P
   2. Q
   3. R
   4. S
2. Which of the following compounds is the least ionic in character?
   1. MgCl2(s)
   2. BeCl2(s)
   3. BaCl2(s)
   4. CaCl2(s)
3. Hydrogen bonds are found in all of the following compounds: glycerol, C3H5(OH)3(l), water, H2O(l), ethanol, C2H5(OH)(l), and ethylene glycol, C2H4(OH)2(l). Which of the compounds listed would have the highest boiling point?
   1. water
   2. ethanol
   3. glycerol
   4. ethylene

Numerical Response #1

The hydrides of some group 14 elements are listed below.

1. SiH4
2. CH4
3. SnH4
4. GeH4

The hydrides arranged in order of increasing boiling point will be \_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_.

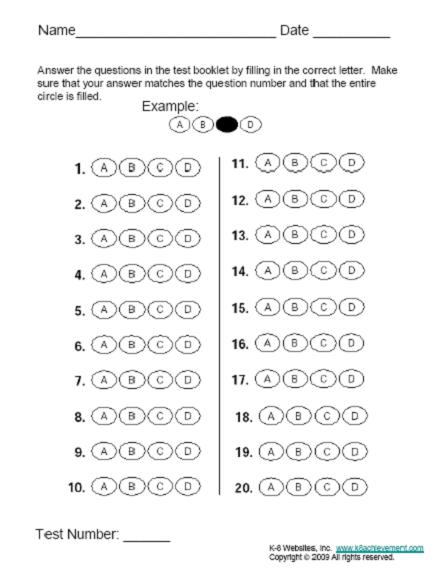
Numerical Response #2

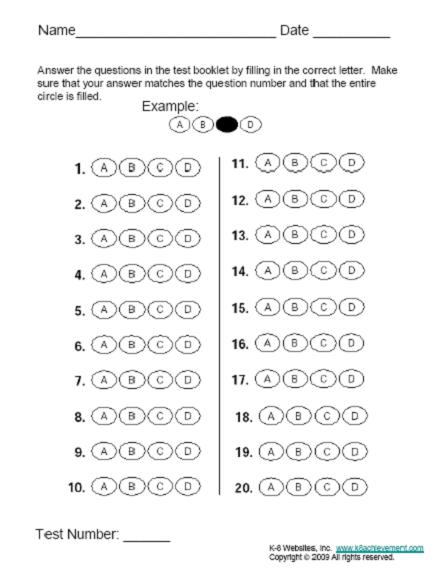
The following substances arranged in order of increasing intermolecular forces between their molecules will be \_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_.

1. HCl(g)
2. Cl2(g)
3. H2O(g)

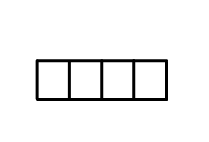
Answer Sheet

Multiple Choice

[](http://www.google.ca/url?sa=i&rct=j&q=&esrc=s&frm=1&source=images&cd=&cad=rja&docid=_zD-2qRq7ldK1M&tbnid=6SUxpTHb1qo-8M:&ved=0CAUQjRw&url=http://ornitoburgos.es/ym-bubble-answer-sheets/&ei=9CKyUoabI-L4yQH_kYGwBQ&bvm=bv.58187178,d.aWc&psig=AFQjCNEzCAd5Egaxosz1-zRzOvvzdgG4SA&ust=1387492319902117)

[](http://www.google.ca/url?sa=i&rct=j&q=&esrc=s&frm=1&source=images&cd=&cad=rja&docid=_zD-2qRq7ldK1M&tbnid=6SUxpTHb1qo-8M:&ved=0CAUQjRw&url=http://ornitoburgos.es/ym-bubble-answer-sheets/&ei=9CKyUoabI-L4yQH_kYGwBQ&bvm=bv.58187178,d.aWc&psig=AFQjCNEzCAd5Egaxosz1-zRzOvvzdgG4SA&ust=1387492319902117)

Numerical Response

1. 

2. 