Dougherty Valley HS Chemistry Assess # 2 Fall Review

- What is the coefficient for water when the following equation is balanced? As(OH)₃(s) + H₂SO₄(aq) → As₂(SO₄)₃(aq) + H₂O(1) A) 6 B) 1
 - C) 12
 - D) 4
 - E) 2
- 2. Which of the following groups contains no ionic compounds?
 - A) PCl₅, LiBr, Zn(OH)₂
 - B) NaH, CaF₂, NaNH₂
 - C) CH_2O , H_2S , NH_3
 - D) KOH, CCl₄, SF₄
 - E) HCN, NO₂, $Ca(NO_3)_2$
- 3. Rank the following from **smallest to largest** atomic radius.
 - Ca, O, Ba, Zn
 - A) O, Ca, Zn, Ba
 - B) O, Zn, Ba, Ca
 - C) Ca, Ba, Zn, O
 - D) Ba, Ca, Zn, O
 - E) O, Zn, Ca, Ba
- 4. The forces of attraction that hold a diamond together are called
 - A) network covalent
 - B) London dispersion
 - C) hydrogen
 - D) electrovalent
 - E) ionic

5. What is the sum of the coefficients of the following equation when it is balanced using smallest whole number integers?

 $NaNH_2 + NaNO_3 \rightarrow NaN_3 + NaOH$

- + NH₃ A) 7
- A) / B) 9
- C) 6
- C) 0 D) 5
- E) 8
- 6. Which of the following statements *BEST* describes the Halogens?
 - A) They have Six valence electron, and they form ions with a 2change.
 - B) They have Six valence electron, and they form ions with a 2+ charge.
 - C) They have Seven valence electrons, and they form ions with a 1+ charge.
 - D) They have Seven valence electrons, and they form ions with a 1- charge.
- Determine the coefficient for O₂ when the following equation is balanced in standard form (smallest whole number integers)

 $C_4H_{10}(g) + O_2(g) \rightarrow CO_2(g) + H_2O(g)$

- A) 13
- B) 4
- C) 8
- D) 20
- D) 20
- E) 10

- 8. Which atoms are *most* likely to form covalent bonds?
 - A) non-metal atoms that share electrons
 - B) metal and non-metals atoms sharing electrons
 - C) metal atoms that share electrons
 - D) non-metal atoms that share protons
 - E) metal atoms that share protons
- 9. In the reaction between magnesium and sulfur, the magnesium atoms
 - A) become cations.
 - B) become part of polyatomic ions.
 - C) share electrons with sulfur.
 - D) become anions.
- 10. Which compound contains the highest percent by mass of hydrogen?
 - \dot{A}) H_2S
 - B) HCl
 - C) H₂O
 - D) HF
 - E) H_2SO_4
- 11. The electron pair in a C-F bond could be considered
 - A) centrally located directly between the C and F.
 - B) closer to C because carbon has a larger radius and thus exerts greater control over the shared electron pair.
 - C) an inadequate model since the bond is ionic.
 - D) closer to F because fluorine has a higher electronegativity than carbon.
 - E) closer to C because carbon has a lower electronegativity than fluorine.

- 12. What is the molar mass of ethanol (C₂H₅OH)?
 - A) 62.07
 - B) 45.06
 - C) 34.06
 - D) 42.04
 - E) 46.07
- 13. Which of the following molecules has no dipole moment?
 - A) H₂O
 - B) none
 - C) all
 - D) NH₃
 - E) CO₂
- 14. Atoms with very similar electronegativity values are expected to form
 - A) covalent bonds.
 - B) ionic bonds.
 - C) no bonds.
 - D) triple bonds.
 - E) none of these
- 15. In the balanced molecular equation for the neutralization of sodium hydroxide with sulfuric acid, the products are:
 - A) $2NaSO_4 + H_2O$
 - B) $Na_2SO_4 + 2H_2O$
 - C) NaSO₃ + 2H₂O
 - D) $NaSO_4 + H_2O$
 - E) $Na_2S + 2H_2O$

Use the following to answer question 16:

Aqueous solutions of barium chloride and silver nitrate are mixed to form solid silver chloride and aqueous barium nitrate.

- 16. The balanced molecular equation contains which one of the following terms?
 - A) 3AgCl(s)
 - B) 2Ba(NO₃)₂
 - C) AgCl(s)
 - D) 2AgCl(s)
 - E) BaNO₃
- 17. Which of the following molecules is non-polar overall?
 - A) \overline{SF}_2
 - B) CCl₄
 - C) H₂S
 - D) OCl₂
 - E) SF₄
- 18. When electrons in a molecule are not found between a pair of atoms but move throughout the molecule, this is called
 - A) covalent bonding.
 - B) polar covalent bonding.
 - C) delocalization of the electrons.
 - D) a dipole moment.
 - E) ionic bonding.
- 19. Give (in order) the correct coefficients to balance the following reaction:
 - $H_2SnCl_6 + H_2S \rightarrow SnS_2 + HCl$
 - A) 6, 2, 1, 1
 - B) 1, 2, 1, 6
 - C) 2, 4, 2, 6
 - D) 1, 1, 1, 6
 - E) 1, 2, 2, 2

- 20. Which of the following statements are *true* concerning ionic bonding?
 - A) CaCl₂ forms because Ca²⁺ is always a more stable species than the calcium atom alone.
 - B) Compounds with ionic bonds tend to have low melting points.
 - C) The electronegativity difference between the bonding atoms of ionic compounds is small since the electrons are not shared but rather held together by electrostatic forces.
 - D) Ionic bonding occurs between a metal, which has a high affinity for electrons, and a nonmetal, which loses electrons relatively easy.
 - E) All of the above statements are false.
- 21. Which element has the fewest electrons in its valence shell?
 - A) Br
 - B) Cs
 - C) 0
 - D) Mg
 - E) P
- 22. Balanced chemical equations imply which of the following?
 - A) Numbers of molecules are conserved in chemical change.
 - B) Numbers of atoms are conserved in chemical change.
 - C) Volume is conserved in chemical change.
 - D) a and b
 - E) b and c

- 23. When the following equation is balanced, what is the sum of the coefficients?
 Al₂(SO₄)₃ + Ca(OH)₂ → Al(OH)₃ + CaSO₄
 - A) 3
 - B) 4
 - Ć) 9
 - D) 10
 - E) 8
- 24. Which of the following bonds would be the most polar without being considered ionic?
 - A) 0-0
 - B) Mg-O
 - C) Si-O
 - D) N-O
 - E) C-O
- 25. What type of reaction is below $2HCl \rightarrow H_2 + Cl_2$
 - A) Combustion
 - B) Double Replacement
 - C) Decompositon
 - D) synthesis
 - E) Single Replacement
- 26. This molecule shows the smallest number of lone pairs in its Lewis structure.
 - A) C_2H_6
 - B) CH₃CHO
 - C) CO₂
 - D) CH₃Cl
 - E) none

- 27. Compared to Oxygen, which of the following elements would be expected to have same number of valence electrons?
 - A) N
 - B) Si
 - C) Al
 - D) S
 - E) O
- 28. Order the following ions from smallest to largest atomic size.
 - As^{3–}, Se^{2–}, Sr²⁺, Rb⁺, Br[–]
 - A) $Rb^+ < Br^- < Sr^{2+} < As^{3-} < Se^{2-}$
 - B) $Sr^{2+} < Rb^+ < Br^- < Se^{2-} < As^{3-}$
 - C) $As^{3-} < Se^{2-} < Br^{-} < Rb^{+} < Sr^{2+}$
 - D) $Sr^{2+} < Rb^+ < As^{3-} < Se^{2-} < Br^-$
 - E) $As^{3-} < Se^{2-} < Br^{-} < Sr^{2+} < Rb^{+}$
- 29. Which of the following molecules (or ions) has a dipole moment?
 - A) two of them do
 - B) NH^+_4
 - C) PF₃
 - D) CO₂
 - E) CO²⁻
- 30. What is the coefficient for oxygen when the following equation is balanced?
 NH₃(g) + O₂(g) → NO₂(g) + H₂O(g)
 - A) 6
 - B) 12
 - C) 3
 - D) 14
 - E) 7

- 31. Based on electronegativity differences, which of the following is most likely to be ionic?
 - A) CH₄
 - B) NO₃
 - C) Cl₂
 - D) BaF_2
 - E) NH₃
- 32. In the Lewis structure for SF_6 , the central sulfur atom shares

_____ electrons.

- A) 10
- B) 4
- C) 12
- D) 8
- E) none of the above, because SF_6 is an ionic compound
- 33. Predict the products of the single replacement below.
 - $Sr + Al_2(SO_4)_3 -->$
 - A) $Sr + Al_2(SO_4)_3$
 - B) $SrAl + SO_4$
 - C) SrSO + Al
 - D) $Sr_2SO_4 + Al$
 - E) $SrSO_4 + Al$
- 34. What is the correct chemical formula for copper(II) oxide?
 - A) Cu_3O_2
 - B) CuO
 - C) Cu₃O
 - D) CuO_3
 - E) Cu_2O_3
- 35. Which of the following compounds contains only one unshared pair of valence electrons?
 - A) BeF₃
 - B) CH₄
 - C) NH₃
 - D) H₂O
 - E) NaCl

- 36. Predict the product of the double replacement reaction below. Fe₃(PO₄)₂ + CuCO₃ -->
 - A) $Fe_3(PO_4)_2 + CuCO_3$
 - B) $PO_4CO_3 + FeCu$
 - C) FeCO + CuCO
 - $D) \quad Fe_3CO_3 + Cu(PO_4)_2$
 - E) $FeCO_3 + Cu_3(PO_4)_2$
- 37. Which of the following *BEST* explains why the atomic radius changes going across a period (L --> R)?
 - A) Increased nuclear charge
 - B) More principle energy levels
 - C) Decrease nuclear charge
 - D) Fewer principle energy levels
- 38. The ability to conduct electricity in the solid state is a characteristic of metallic bonding. This characteristic is *best* explained by the presence of
 - A) high electronegativities
 - B) high ionization energies
 - C) mobile protons
 - D) immobile protons
 - E) mobile electrons
- 39. When Nitrogen and fluorine atoms combine to form a molecule of NF₃, 6 electrons will be
 - A) evenly distributed
 - B) Lost
 - C) shared unequally
 - D) Shared equally
 - E) Gained

40. Phosphoric acid can be prepared by reaction of sulfuric acid with "phosphate rock" according to the equation:

$$\begin{array}{c} \operatorname{Ca}_{3}(\operatorname{PO}_{4})_{2} + 3\operatorname{H}_{2}\operatorname{SO}_{4} \rightarrow 3\operatorname{CaSO}_{4} + \\ 2\operatorname{H}_{3}\operatorname{PO}_{4} \end{array}$$

What is the molar mass of $Ca_3(PO_4)_2$?

A) 278.18 g / mol
B) 310.18 g / mol
C) 166.02 g / mol

- D) 87.05 g / mol
- E) 215.21 g / mol
- 41. Atoms having greatly differing electronegativities are expected to form:
 - A) ionic bonds
 - B) nonpolar covalent bonds
 - C) no bonds
 - D) covalent bonds
 - E) polar covalent bonds
- 42. The elements chlorine and iodine have similar chemical properties because they
 - A) have the same number of stable isotopes
 - B) are both metals
 - C) are in the same chemical period
 - D) have the same number of electrons in their outer energy levels
 - E) none of these
- 43. Which of the following exhibits the correct orders for both atomic radius and ionization energy, respectively?
 - A) Se, As, Sb, and Sb, As, Se
 - B) Sb, Se, As, and Sb, Se, As
 - C) Sb, As, Se, and Se, As, Sb
 - D) Se, Sb, As, and As, Sb, Se
 - E) none of these

- 44. How many of the following molecules possess dipole moments?BH₃, CH₄, PCl₅, H₂O, HF, H₂
 - A) 4
 - B) 1
 - C) 5
 - D) 3
 - E) 2
- 45. Why is Aluminum's atomic radius larger then Boran and Silicon?
 - A) smallest number of energy levels and largest effective nuclear charge
 - B) largest number of energy levels and smallest effective nuclear charge
 - C) smallest number of energy levels and smallest effective nuclear charge
 - D) largest number of energy levels and largest effective nuclear charge
- 46. In balancing an equation, we change the ______ to make the number of atoms on each side of the equation balance.
 - A) formulas of compounds in the products
 - B) subscripts of compounds
 - C) coefficients of compounds
 - D) formulas of compounds in the reactants
 - E) none of these
- 47. Which of the following has the smallest atomic radius?
 - A) Cl
 - B) S
 - C) F
 - D) Br
 - E) N

- 48. What type of reaction is below
 - $C_2H_5OH + 3O_2 --> 2CO_2 + 3H_2O$
 - A) Combustion
 - B) synthesis
 - C) Double Replacement
 - D) Decompositon
 - E) Single Replacement

Use the following to answer questions 49-54:

Select the correct molecular structure for the given species from the choices below:

- 49. BeCl₂
 - A) linear
 - B) trigonal planar
 - C) tetrahedral
 - D) bent
 - E) trigonal pyramidal
- 50. XeF₄
 - A) pyramidal
 - B) tetrahedral
 - C) square planar
 - D) octahedral
 - E) Trigonal Planar
- 51. SiH₄
 - A) trigonal pyramidal
 - B) tetrahedral
 - C) square planar
 - D) octahedral
 - E) none of these
- $52.\ IF_4^-$
 - A) trigonal pyramidal
 - B) tetrahedral
 - C) square planar
 - D) octahedral
 - E) none of these

- 53. NI₃
 - A) trigonal pyramidal
 - B) tetrahedral
 - C) square planar
 - D) octahedral
 - E) none of these
- 54. BeF3⁻
 - A) a) pyramidal
 - B) b) none of these
 - C) c) octahedral
 - D) d) trigonal planar
 - E) e) bent
- 55. The noble gases contain how many valence electrons?
 - A) 0
 - B) 1
 - C) 8
 - D) 7
 - E) none of these
- 56. What type of reaction is below $2H_2 + O_2 --> 2H_2O$
 - A) Double Replacement
 - B) Combustion
 - C) synthesis
 - D) Decompositon
 - E) Single Replacement
- 57. Which of the following bonds is least polar?
 - A) They are all nonpolar.
 - B) Br—Br
 - C) C—O
 - D) S—Cl
 - E) H—C

- 58. In the Lewis structure for elemental nitrogen there is (are)
 - A) a triple bond between the nitrogens.
 - B) three unpaired electrons.
 - C) a double bond between the nitrogens.
 - D) a single bond between the nitrogens.
 - E) none of the above.
- 59. Which of the following Lewis structures best describes BF₃?



- 60. A reaction occurs between sodium carbonate and hydrochloric acid producing sodium chloride, carbon dioxide, and water. The correct set of coefficients, respectively, for the balanced reaction is:
 - A) 5 10 10 5 5
 - B) 3 6 6 3 4
 - C) 1 2 2 1 1 D) 0 6 5 10 5
 - D) 8 6 5 10 5 E) none of these
- 61. Which of the following atoms has the highest ionization energy?
 - A) Si
 - B) As
 - C) Al
 - D) Sb
 - E) P
- 62. An element with an electronegativity of 0.9 bonds with an element with an electronegativity of 3.1. Which of the following phrases *best* describes the bond between these elements?
 - A) Mostly ionic in character and formed between a metal and a non-metal
 - B) Mostly metallic in character and formed between two metals
 - C) Mostly covalent in character and formed between two non-metals
 - D) mostly covalent in character and formed between a metal and a non-metal
 - E) Mostly ionic in character and formed between two non-metals

- 63. What type of reaction is below 2A1 + 3Pb(NO₃)₂ ---> 3Pb + 2A1(NO₃)₃
 - A) Single Replacement
 - B) Double Replacement
 - C) Combustion
 - D) synthesis
 - E) Decompositon
- 64. Order the elements S, Cl, and F in terms of increasing ionization energy.
 - A) Cl, F, S
 - B) S, F, Cl
 - C) F, Cl, S
 - D) S, Cl, F
 - E) F, S, Cl
- 65. Which of the following atoms cannot exceed the octet rule in a molecule?
 - A) I
 - B) P
 - C) N
 - D) S
 - E) All of the atoms (a-d) can exceed the octet rule.

Answer Key

- 66. Choose the compound with the most ionic bond.
 - A) KF
 - B) NaCl
 - C) LiF
 - D) KCl
 - E) LiCl
- 67. Order the elements S, Cl, and F in terms of increasing atomic radii.
 - A) F, Cl, S
 - B) S, Cl, F
 - C) Cl, F, S
 - D) S, F, Cl
 - E) F, S, Cl
- 68. What type of reaction is below $Na_2CO_3 + H_2SO_4 ---> Na_2SO_4 + CO_2 + H_2O$
 - A) Single Replacement
 - B) Combustion
 - C) Double Replacement
 - D) Decompositon
 - E) synthesis

1. A	15. B	29. C	43. A	57. B
2. C	16. D	30. E	44. E	58. A
3. E	17. B	31. D	45. B	59. C
4. A	18. C	32. C	46. C	60. C
5. B	19. B	33. E	47. C	61. E
6. D	20. E	34. B	48. A	62. A
7. A	21. B	35. C	49. A	63. A
8. A	22. B	36. E	50. C	64. D
9. A	23. C	37. A	51. B	65. C
10. C	24. C	38. E	52. C	66. A
11. D	25. C	39. C	53. A	67. A
12. E	26. A	40. B	54. D	68. C
13. E	27. D	41. A	55. C	
14. A	28. B	42. D	56. C	