Dougherty Valley HS Chemistry
Fall Final Exam - Practice Test

S-23*

This practice test is a general guideline to help you study. It is NOT a definitive list. There are potentially things on here that will not show up on the test, and there are potentially things not on this list that will show up on the test. Material that appeared in Warm Ups, Notes, Homework, Classwork, Labs, Study Materials, etc are all have the potential to appear on the test. ***Please time yourself! This practice test should take a maximum of 140 minutes to ensure you are going fast enough to finish the actual Test in class!***

1. What is the correct chemical formula for copper(II) oxide?
   A) Cu_3O_2
   B) Cu_2O_3
   C) CuO
   D) CuO_3
   E) Cu_3O

2. List the three main subatomic particles.

3. An example of a chemical change is
   A) an ice cube melting in a drink
   B) digesting a pizza
   C) coffee spilled on a shirt
   D) boiling alcohol
   E) grinding coffee beans.

4. With which of the following would fluorine atoms MOST easily combine to form an ionic compound?
   A) sulfur
   B) carbon
   C) oxygen
   D) chlourine
   E) Sodium

5. The correct formula for iron(III) phosphide is
   A) FeP_3
   B) Fe_3P
   C) Fe_2P_3
   D) FeP
   E) Fe_3P_2

6. ~~Consider a certain type of nucleus that has a half-life of 32 min. Calculate the percent of original sample of nuclides remaining after 2.5 hours have passed.~~
   ~~A) 40 %~~
   ~~B) 3.9 %~~
   ~~C) 96.1 %~~
   ~~D) 3.2 %~~
   ~~E) 6.9 %~~

7. Which of the following exhibits the correct orders (large to small) for both atomic radius and ionization energy, respectively?
   A) Te, Br, Se, and Te, Br, Se
   B) Te, Se, Br, and Br, Se, Te
   C) Br, Se, Te, and Te, Se, Br
   D) Se, Br, Te, and Te, Br, Se
   E) Br, Te, Se, and Se, Te, Br

8. What is the name of the compound whose formula is NO_2
   A) Dinitrogen oxide
   B) Nitrogen oxide
   C) Nitrogen (V) oxide
   D) Nitrogen pentoxide
   E) nitrogen dioxide

9. How many protons, electrons, and neutrons, respectively, does ^{16}O have?
   A) 8, 18, 16
   B) 8, 14, 8
   C) 8, 18, 8
   D) 8, 10, 8
   E) 8, 8, 8

10. How many grams of H_2O will be formed when 32.0 g H_2 is mixed with O_2 and allowed to react to form water?
    A) 22.5 g
    B) 144 g
    C) 90.1 g
    D) 45.0 g
    E) 286 g

11. Which of the following atomic symbols is incorrect?
    A) $^{39}_{19}K$
    B) $^{14}_{8}N$
    C) $^{14}_{6}C$
    D) $^{37}_{17}Cl$
    E) $^{32}_{15}P$

12. How many atoms are represented by one molecule of aluminum dichromate, $Al_2(Cr_2O_7)_3$?
    A) 25
    B) 29
    C) 9
    D) 27
    E) 14

13. Which of the following *BEST* describes alkali metal?
    A) They have one valence electron, and they form ions with a 1+ charge.
    B) They have one valence electron, and they form ions with a 2- charge
    C) They have one valence electron, and they form ions with a 1- change.
    D) They have two valence electrons, and they form ions with a 2+ charge.
    E) They have two valence electrons, and they form ions with a 2- charge.

14. Which of the following is the atomic number of a halogen?
    A) 17
    B) 136
    C) 27
    D) 10
    E) 13

15. ~~The cesium-131 nuclide has a half-life of 30 years. After 90 years, about 6 g remains. The original mass of the cesium-131 sample is closest to~~
    ~~A) 70 g~~
    ~~B) 30 g~~
    ~~C) 60 g~~
    ~~D) 40 g~~
    ~~E) 50 g~~

16. Balance the following equation in standard form and determine the sum of the coefficients.

$$FeO(s) + O_2(g) \rightarrow Fe_2O_3(s)$$

    A) 7
    B) 3
    C) 14
    D) 6
    E) 4

17. Calculate the molar mass of $NaHSO_4$.
    A) 132 g/mol
    B) 124 g/mol
    C) 120 g/mol
    D) 100 g
    E) 120 g

18. How many *d* electrons are there in an iron atom?
    A) 3
    B) 6
    C) 26
    D) 56
    E) 2

19. If a 100.-g sample of platinum metal has a volume of 4.668 mL, what is the density of platinum in g/cm^3?
    A) 2.14 g/cm^3
    B) 0.0467 g/cm^3
    C) 467 g/cm^3
    D) 21.4 g/cm^3
    E) none of these

20. What is the chemical formula for Mercury (I) oxide
    A) Hg_2O_4
    B) HgO_2
    C) HgO
    D) Hg_2O_2
    E) Hg_2O

21. The prefix "penta" means
    A) 2
    B) 3
    C) 4
    D) 5
    E) 1

22. An atom with 15 protons and 16 neutrons is an atom of
    A) S
    B) Pd
    C) Rh
    D) P
    E) Ga

23. $1s^2 2s^2 2p^6 3s^2 3p^6$ Represents this type of element
    A) Noble Gases
    B) Halogens
    C) Alkali Metals
    D) Metal/Non-metal
    E) Alkaline Earth Metals

24. Nitrogen, Phosphorus, Sulfur, Oxygen represent these elements
    A) Alkali Metals
    B) Noble Gases
    C) Non-metal
    D) Alkaline Earth Metals
    E) Halogens

25. The cation of table salt is made from one of these types of elements
    A) Alkaline Earth Metals
    B) Noble Gases
    C) Alkali Metals
    D) Metal/Non-metal
    E) Halogens

26. These elements become more reactive as you decrease their atomic number.
    A) Alkaline Earth Metals
    B) Metal/Non-metal
    C) Halogens
    D) Noble Gases
    E) Alkali Metals

27. Barium is this type of element
    A) Metal/Non-metal
    B) Halogens
    C) Alkaline Earth Metals
    D) Noble Gases
    E) Alkali Metals

28. What type of rxn is $CH_4 + O_2 \rightarrow CO_2 + H_2O$ (unbalanced)
    A) synthesis
    B) decomposition
    C) combustion
    D) single replacement
    E) double replacement

29. The number of neutrons in one atom of $^{206}_{82}Hg$ is
    A) 124
    B) 82
    C) 288
    D) 206
    E) none of these

30. The noble gas electron configuration for Cr^{2+} is
    A) $[Ar]4s^23d^2$
    B) $[Ar]4s^23d^4$
    C) $[Ar]4s^13d^5$
    D) $[Kr]3d^4$
    E) $[Ar]3d^4$

31. 28g of nitrogen dioxide and excess water are allowed to produce nitric acid (HNO_3) and nitrogen monoxide. If 22g of nitric acid are produced what is the percentage yield?
    A) 100%
    B) 56.27%
    C) 86.05%
    D) 113.64%
    E) 72.43%

32. Identify the missing particle in the following equation:
    $^{238}_{92}U \rightarrow {}^{4}_{2}He + ?$
    A) $^{234}_{92}U$
    B) $^{242}_{94}Pu$
    C) $^{234}_{90}Th$
    D) $^{242}_{90}Th$
    E) none of these

33. According to the following Nuclear Equation, $^{238}_{92}U \rightarrow {}^{234}_{90}Th$ + ____, which particle is produced?
    A) $^{4}_{2}He$
    B) $^{0}_{-1}\beta$
    C) $^{0}_{+1}\beta$
    D) $^{1}_{0}n$
    E) $^{0}_{0}\gamma$

34. When balanced, what is the sum of the coefficients?
    $Al_2(SO_4)_3+Ca(OH)_2 \rightarrow Al(OH)_3+CaSO_4$
    A) 3
    B) 4
    C) 9
    D) 10
    E) 8

35. How many protons are in a neutral atom with the electron configuration below? $1s^22s^22p^63s^23p^4$
    A) 14
    B) 10
    C) 12
    D) 17
    E) 16

36. The electron configuration for the sulfur atom is
    A) $1s^22s^22p^63s^23p^4$
    B) $1s^22s^22p^63s^23p^5$
    C) $1s^22s^22p^4$
    D) $1s^22s^22p^63s^5$
    E) $1s^22s^22p^63s^23p^2$

37. Which of the following is a product of α decay of $^{238}_{92}U$?
    A) $^{238}_{93}Np$
    B) $^{235}_{92}Pu$
    C) $^{234}_{90}Th$
    D) $^{238}_{91}Pa$
    E) $^{235}_{92}U$

38. Which of the following is an element?
    A) oxygen
    B) brass
    C) earth
    D) salt
    E) water

~~39. A particular radioactive element has a half-life of 6.95 days. What percent of the original sample is left after 15.0 days?~~
    ~~A) 11.2%~~
    ~~B) 22.4%~~
    ~~C) 44.8%~~
    ~~D) 47.3%~~
    ~~E) 77.6%~~

40. Which of the following elements is an alkaline earth metal?
    A) Cu
    B) Fe
    C) Sc
    D) Ca
    E) Na

41. How many neutrons are contained in an iodine nucleus with a mass number of 131?
    A) 78
    B) 53
    C) 127
    D) 131
    E) 74

42. Alpha particles are
    A) protons
    B) helium nuclei
    C) X rays
    D) neutrons
    E) electrons

43. How many electrons are in the fourth principal energy level (n = 4) of one atom of Br?
    A) 18
    B) 2
    C) 7
    D) 17
    E) none of these

44. How many atoms of hydrogen are in one molecule of CH_3Cl?
A) 3
B) 30×10^{23}
C) 6×10^{23}
D) 18×10^{23}
E) 6

45. Titanium(IV) oxide has the formula
A) Ti(IV)O
B) TiO_2
C) TiO_4
D) Ti_4O_2
E) Ti_4O

46. Which of the following elements is most similar to lithium?
A) Na
B) Hg
C) Mg
D) Au
E) He

47. The chemical formula for dicarbon hexahydride is
A) C_3H_8
B) CH_2
C) CH_4
D) CH
E) C_2H_6

~~48. The number of a certain radioactive nuclide present in a sample decays from 160. to 20. in 32 minutes. What is the half-life of this radioactive species?~~
~~A) 21 minutes~~
~~B) 16 minutes~~
~~C) 26 minutes~~
~~D) 11 minutes~~
~~E) 6 minutes~~

49. Which of the following has the electron configuration $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^5$?
A) Ca
B) Cl
C) Br
D) Cr
E) Mn

50. When an electron in the ground state absorbs energy, it goes to a(n) _____ state.
A) ionic
B) stable
C) excited
D) lower
E) frenetic

~~51. Consider a certain type of nucleus that has a rate constant of 2.10×10^{-2} min^{-1}. Calculate the time required for the sample to decay to one-fourth of its initial value.~~
~~A) 66.0 min~~
~~B) 2.10 min~~
~~C) 41.3 min~~
~~D) 0.0420 min~~
~~E) 33.0 min~~

~~52. A sample of a radioactive element decays to 27.3% of its original amount of radioactive nuclides in 15 years. What is the half-life of this radioactive element?~~
~~A) 8.7 years~~
~~B) 33. years~~
~~C) 92.0 years~~
~~D) 2.5 years~~
~~E) 8.0 years~~

Use the following to answer question 53:
Consider the following molecules.
I. BF_3
II. $CHBr_3$ (C is the central atom)
III. Br_2
IV. $XeCl_2$
V. CO
VI. SF_4
Select the molecule(s) that fit the given statement.

53. These molecules follow the octet rule.
A) II, III, V
B) I, IV, VI
C) I, III, IV, VI
D) I, II, IV
E) III, V, VI

Use the following to answer questions 54-58:
__ H_2 (*g*) + __ CO (*g*) → __ CH_3OH (*l*)
68.5 kg

54. Which of the following sets of coefficients represent those of the balanced equation?
A) 1, 1, 1
B) 2, 2, 1
C) 1, 2, 2
D) 2, 1, 2
E) 2, 1, 1

55. How many moles of the product are produced?
A) 8.60×10^3
B) 4.27×10^3
C) 2.45×10^3
D) 2.14×10^3
E) 8.54×10^3

56. What is the percent yield if the actual yield is 3.57×10^4 g?
A) 92%
B) 88%
C) 46%
D) 103%
E) 76%

57. What was the theoretical yield?
A) 3.57×10^4 g
B) 2.45×10^3
C) 7.83×10^4 g
D) 0.456 g
E) Not able to be determined

58. How many moles of H_2 were needed to use up all of the CO?
    A) 2.74×10^2
    B) 8.60×10^3
    C) 4.89×10^3
    D) 1.20×10^5
    E) 3.56×10^3

59. An element has the electron configuration $[Kr]5s^24d^{10}5p^2$. The element is a(n)
    A) actinide.
    B) nonmetal.
    C) lanthanide.
    D) transition element.
    E) metal.

60. Which type of rxn: $HCl + KOH \rightarrow KCl + H_2O$ (unbalanced)
    A) Double Replacement
    B) Combustion
    C) decomposition
    D) Single Replacement
    E) Synthesis

61. How many neutrons are there in one atom of $^{47}_{22}Ti$?
    A) 68
    B) 46
    C) 22
    D) 24
    E) none of these

62. A 42.9-g sample of Ca contains how many calcium atoms?
    A) 6.45×10^{23} atoms
    B) 2.58×10^{25} atoms
    C) 42.9 atoms
    D) 1.07×10^0 atoms
    E) 85.8 atoms

63. A phosphorus atom needs to gain _____ electrons to achieve a noble gas configuration.
    A) 3
    B) 6
    C) 2
    D) 4
    E) 5

64. Which of the following could be an atomic number for a Halogen
    A) 4
    B) 54
    C) 35
    D) 11
    E) 16

65. Which of these is an element?
    A) brass
    B) silver
    C) iron ore
    D) water
    E) wood

66. The symbol for the element strontium is
    A) Str
    B) Sr
    C) St
    D) Sm
    E) S

67. Rutherford's experiment was important because it showed:
    A) the mass of the atom is uniformly distributed throughout the atom.
    B) a zinc sulfide screen scintillates when struck by a charged particle.
    C) an atom is mostly empty space.
    D) gold foil can be made to be only a few atoms thick.
    E) radioactive elements give off alpha particles.

68. When ethane (C_2H_6) is reacted with oxygen in the air, the products are carbon dioxide and water. This process requires _____ mol of oxygen for every 1.13 mol of ethane.
    A) 2.82
    B) 7.91
    C) 1.13
    D) 5.09
    E) 3.95

69. Calculate the number of moles in 2.43 kg of Be
    A) 0.270
    B) 27.0
    C) 843
    D) 270
    E) 0.000270

70. ___C_3H_8 + ___O_2 --> ___CO_2 + ___H_2O
    What are the coefficients when you balance the above equation?
    A) 1,1,1,1
    B) 2,6,4,6
    C) 4,7,5,2
    D) 2,2,2,2
    E) 1,5,3,4

71. Suppose the unbalanced reaction $Ca_3(PO_4)_2 + H_2SO_4 \rightarrow CaSO_4 + H_3PO_4$ is carried out starting with 103 g of $Ca_3(PO_4)_2$ and plenty of H_2SO_4. How much phosphoric acid (H_3PO_4) will be produced?
    A) 65.1 g
    B) 108.0 g
    C) 39.5 g
    D) 59.3 g
    E) 88.9 g

72. How many atoms of oxygen are in one molecule of calcium hydrogen sulfate?
    A) 4
    B) 8
    C) 3
    D) 5
    E) 6

73. How many molecules of CH_4 are in 65 grams of CH_4?
A) 3.1×10^{24} atoms
B) 4×10^{24} atoms
C) 2.4×10^{24} atoms
D) 1.4×10^{24} atoms
E) 2.5×10^{24} atoms

74. Antimony can be represented by which of the following noble gas configurations?
A) $[Kr]5s^24d^{10}5p^6$
B) $[Kr]5s^25d^{10}5p^6$
C) $[Kr]5s^24d^{10}5p^5$
D) $[Kr]5s^24d^{10}5p^3$
E) $[Kr]5s^25d^{10}5p^5$

75. What is the mass of 8 atom(s) of copper in grams?
A) 6.022×10^{23} g
B) 8.44×10^{-22}g
C) 1.18×10^{21} g
D) 4.78×10^{-24} g
E) 508.4 g

76. What type of reaction is $Mg + O_2 \rightarrow MgO$ (unbalanced)?
A) Double Replacement
B) Synthesis
C) Single Replacement
D) decomposition
E) Combustion

77. When $^{230}_{90}\mathrm{Th}$ decays by producing an alpha particle, the product nuclide is _____.
A) $^{226}_{87}\mathrm{Ra}$
B) $^{226}_{88}Fr$
C) $^{226}_{88}\mathrm{Ra}$
D) $^{226}_{88}At$
E) $^{226}_{89}\mathrm{Ra}$

78. What is the sum of the coefficients for the reaction:
$4NH_3(g) + 7O_2(g) \rightarrow 4NO_2(g) + 6H_2O(g)$
A) 16
B) 21
C) 10
D) 13
E) 4

79. An atom that has an electron configuration of $1s^22s^22p^63s^23p^6$ is classified as
A) an alkali metal
B) a halogen
C) a transition metal
D) an alkaline earth element
E) a noble gas element

80. Which of the following best describes the "trend" for electronegativity across periods (L->R) and down groups, respectively (periods/groups)?
A) Decrease / Increase
B) Increase / Increase
C) neither
D) Decrease / Decrease
E) Increase / Decrease

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

$Ca_3(PO_4)_2 + 3H_2SO_4 \rightarrow 3CaSO_4 + 2H_3PO_4$

Suppose the reaction is carried out starting with plenty of $Ca_3(PO_4)_2$ and 75.0 g of H_2SO_4. How many moles of phosphoric acid can be produced?
A) 49.98 mol
B) 1.15 mol
C) 0.51 mol
D) 4.9×10^3 mol
E) Cannot be determined

82. Consider the following reaction:
$CH_4(g) + 4Cl_2(g) \rightarrow CCl_4(g) + 4HCl(g)$
What mass of CCl_4 is formed by the reaction of 5.17 g of methane with an excess of chlorine?
A) 795 g
B) 12.4 g
C) 49.6 g
D) 0.54 g
E) none of these

83. An atom with 45 protons has a mass number of 100. It must contain how many neutrons?
A) 45
B) 100
C) 55
D) 145
E) none of these

84. A homogeneous mixture is also called _____.
A) a pure substance.
B) an element.
C) a solution.
D) a heterogeneous mixture.
E) a compound.

85. In the following nuclear equation, identify the missing product:
$^{43}_{20}\mathrm{Ca} + {}^{4}_{2}\alpha \rightarrow$ _____ $+ {}^{1}_{1}\mathrm{H}$
A) $^{44}_{22}\mathrm{Ti}$
B) $^{46}_{22}\mathrm{Ti}$
C) $^{42}_{18}\mathrm{Ar}$
D) $^{46}_{21}\mathrm{Sc}$

86. The name for $NaHCO_3$ is
A) sodium(I) hydrogen carbonate
B) sodium hydrogen carbonate (sodium bicarbonate)
C) sodium(I) bicarbonate
D) sodium carbonate
E) none of these

87. Which of the following involves a chemical change?
A) chopping wood
B) condensation of water
C) cooking meat
D) melting ice
E) boiling water

88. When magnesium and oxygen form a bond 2 electrons will be
A) Lost by oxygen gained by magnesium
B) Lost by magnesium gained by oxygen
C) Shared equally
D) evenly distributed
E) shared unequally

89. An example of a mixture is
A) gold
B) mercury liquid
C) the air in this room
D) purified water
E) hydrogen fluoride

90. How many protons, electrons, and neutrons, respectively, does $^{27}Al^{3+}$ have?
A) 13, 10, 14
B) 13, 13, 13
C) 13, 10, 27
D) 13, 13, 14
E) 13, 13, 27

91. A stable element will <u>*usually*</u> have how many electrons?
A) Zero
B) 6
C) 8
D) 32
E) 18

92. How many nitrogen atoms are indicated in $Al(NO_3)_3$?
A) 0
B) 9
C) 1
D) 3
E) 4

93. The electron configuration of carbon is $1s^2\ 2s^2\ 2p^2$. How many more electrons does carbon need to satisfy the octet rule?
A) 8
B) 5
C) 2
D) 1
E) 4

94. Which formula represents a trigonal pyramidal molecule (molecular geometry)?
A) NH_3
B) $CaCl_2$
C) HBr
D) CH_4
E) Br_2

95. The maximum # of e- allowed in **each** of the *d* orbitals is
A) 32
B) 10
C) 2
D) 4
E) 18

96. Which of the following contains one or more covalent bonds?
A) Cs_2O
B) CO_2
C) $BaBr_2$
D) CaO
E) NaCl

97. How many grams of $Ca(NO_3)_2$ can be produced by reacting excess HNO_3 with 5.65 g of $Ca(OH)_2$?
A) 11.3 g
B) 25.0 g
C) 5.65 g
D) 12.5 g
E) 6.26 g

98. Rank the following bonds from **least polar to most polar**:
Si-Cl P-Cl Mg-Cl S-Cl
A) Mg-Cl, S-Cl, P-Cl, Si-Cl
B) S-Cl, P-Cl, Mg-Cl, Si-Cl
C) S-Cl, P-Cl, Si-Cl, Mg-Cl
D) Mg-Cl, Si-Cl, P-Cl, S-Cl
E) P-Cl, S-Cl, Si-Cl, Mg-Cl

99. How many molecules of the sodium containing product is made at the end of the single displacement reaction below?
$Na_{(l)} + Al_2O_{3(s)} \rightarrow$
5.79g
A) 1.02×10^{23} molecules
B) 7.58×10^{22} molecules
C) 2.16×10^{22} molecules
D) 3.36×10^{24} molecules
E) 2.16×10^{24} molecules

100. Balance the equation
$Zn(s) + H_3PO_4(aq) \rightarrow Zn_3(PO_4)_2(s) + H_2(g)$

******Has not been checked! Please tell me if you see typos!!!******

Answer Key

1. C
2. electron, proton, neutron
3. B
4. E
5. D
6. B
7. B
8. E
9. E
10. E
11. B
12. B
13. A
14. A
15. E
16. A
17. C
18. B
19. D
20. E
21. D
22. D
23. A
24. C
25. C
26. C
27. C
28. C
29. A
30. E
31. C
32. C
33. A
34. C
35. E
36. A
37. C
38. A
39. B
40. D
41. A
42. B
43. C
44. A
45. B
46. A
47. E
48. D
49. E
50. C
51. D
52. E
53. A
54. E
55. C
56. C
57. C
58. C
59. E
60. A
61. E
62. A
63. A
64. C
65. B
66. B
67. C
68. E
69. D
70. E
71. A
72. B
73. E
74. D
75. B
76. B
77. C
78. C
79. E
80. E
81. C
82. C
83. C
84. C
85. D
86. B
87. C
88. B
89. C
90. A
91. C
92. D
93. E
94. A
95. C
96. B
97. D
98. C
99. B
100. $3Zn(s) + 2H_3PO_4(aq) \rightarrow Zn_3(PO_4)_2(s) + 3H_2(g)$

Here is an additional practice test another teacher made.

(It has not been checked yet, so please let me know if you find any issues/typos!)

https://tinyurl.com/3htmbfpz