- To get the most out of this Practice Final Exam, you should work alone and you should <u>not</u> use your textbook or lecture notes.
- Feel free to use a <u>periodic table</u>, <u>scratch paper</u>, and a <u>non-programmable calculator</u>.
- Time yourself and allow yourself <u>2 hours</u> to finish.
- When you are done with 2 hours, use the answer key on the last page to grade yourself.
- Each question is worth 4 points.
- If you earn < 73% (less than C) you are not yet ready to pass the Final Exam.
- If you didn't finish in 2 hours, go back and finish.
- Use your mistakes to identify the topics/areas on which you need to focus. Be sure to put in plenty of study time and get help as needed.

Soluble salts include:		
- All Li^+, Na^+, K^+, NH_4^+, NO_3^- and $C_2H_3O_2^-$		
- All SO_4^{2-}	except: Ca^{2+}, Sr^{2+}, Ba^{2+}, Pb^{2+}	
- All Cl^-, Br^-, and I^-	except: Ag^+, Pb^{2+}, Hg_2^{2+}	
Insoluble salts include:		
- All PO_4^{3-} and CO_3^{2-}	except: Li^+, Na^+, K^+, and NH_4^+	
- All OH^- and S^{2-}	except: Li^+, Na^+, K^+, NH_4^+, Ca^{2+}, Sr^{2+}, and Ba^{2+}	

Potentially useful information

1 m = 39.37 in.	1 L = 1000 cm^3 = 1.057 qt	1 kg = 2.205 lb
1 in. = 2.54 cm (exactly)	1 gal = 4 qt = 8 pt	1 lb = 16 oz = 453.6 g
	1 gal = 128 fluid ounces	1 ton = 2000 lb
1 mile = 5280 ft	1 gal = 3.785 L	1 mol = 6.022 x 10^{23} things
1 mile = 1.609 km	1 calorie = 4.184 joule (exactly)	Density (water) = 1.00 g/mL
K = °C + 273	1 Calorie = 1000 calorie	Specific heat (water) = 4.184 J/g°C
°C = (°F − 32)/1.8		

1) Which periodic table (P.T.) groups elements with similar properties in the same column?
   A) Mendeleev's P.T.   **B)** the modern P.T.   **C)** both P.T.'s   **D)** neither P.T.

2) On the periodic table, the number 12.01 is written below the symbol for carbon. What is the name we give to this number?
   A) atomic number   **B)** isotope number   **C)** mass number   **D)** atomic mass

3) Where on the periodic table are the alkaline earth metals?
   A) group 1   **B)** group 2   **C)** group 3-12   **D)** elements 59-71

4) What is the symbol (in $^A X$ format) for the isotope with 26 protons and 27 neutrons?
   A) ^{27}Fe **B)** ^{53}Fe **C)** ^{26}Co **D)** ^{53}Co

5) How many neutrons does an atom of ^{37}Cl have?
   A) 17   **B)** 20   **C)** 37   **D)** 35.45

6) How many electrons are there in the As^{3-} ion?
   A) 18   **B)** 30   **C)** 33   **D)** 36

7) Which of the following is <u>not</u> an example of an ionic compound?
   A) NH_4Cl **B)** N_2O_4 **C)** $NaC_2H_3O_2$ **D)** MgO

8) Which of the following polyatomic ions has a -2 charge?
   A) permangante   **B)** phosphite   **C)** nitrate   **D)** dichromate

9) What is the formula for sodium arsenate?
   A) Na_2AsO_3 **B)** Na_3AsO_3 **C)** Na_2AsO_4 **D)** Na_3AsO_4

10) What is the formula for lead(IV) oxalate?
    A) $Pb(C_2H_3O_2)_2$ **B)** $Pb(C_2H_3O_2)_4$ **C)** $Pb(C_2O_4)_2$ **D)** $Pb_3(C_2O_4)_4$

11) What is the formula for zinc phosphate?
    A) $ZnPO_3$ **B)** $Zn_3(PO_3)_2$ **C)** $ZnPO_4$ **D)** $Zn_3(PO_4)_2$

12) What is the formula for calcium nitrate?
    A) $CaNO_3$ **B)** $Ca(NO_3)_2$ **C)** $CaNO_2$ **D)** Ca_2NO_3

13) What is the name for CaO?
    A) calcium(II) monoxide   **B)** calcium(II) oxide   **C)** calcium oxide   **D)** calcium monoxide

14) What is the name for $HNO_2(aq)$?
    A) hydrogen nitrite   **B)** hydrogen nitrate   **C)** nitrous acid   **D)** nitric acid

15) What is the name for $FeClO_2$?
    A) iron(I) chlorite   **B)** iron(I) chlorate   **C)** iron(II) chlorite   **D)** iron(II) chlorate

16) What is the name of Ag_2O?
    A) disilver oxide   **B)** silver oxide   **C)** silver(I) oxide   **D)** silver(II) oxide

17) Which of the following is NOT expected to be water soluble?
    A) $FeCl_3$ **B)** Cu_2SO_4 **C)** $SrCO_3$ **D)** $Mg(NO_3)_2$

18) What is the correct way to write the number 999 with 2 significant figures?
    A) 9.9×10^2 **B)** 9.9×10^3 **C)** 1.0×10^2 **D)** 1.0×10^3

19) Which of the following is not equivalent to the others?
    A) 100 ms   **B)** 0.01 ks   **C)** 10 s   **D)** 1,000 cs

20) Which of the following is the largest volume?
    A) 100 µL   **B)** 10,000 mL   **C)** 0.01 L   **D)** 10^9 nL

21) Which is the correct exponent for the metric prefix mega- (M)?
    A) 10^3 **B)** 10^6 **C)** 10^9 **D)** 10^{12}

22) Which of the following relationships does <u>not</u> represent an exact number?
    A) 12 eggs = 1 dozen   **B)** 1 in. = 2.54 cm   **C)** 1 kg = 2.205 lb   **D)** 1 gal = 8 pt

23) Which of the following measurements has the largest number of significant figures?
    A) 4.0×10^{-8} **B)** 408   **C)** 0.000040   **D)** 4,000

24) Report the following product with the correct significant figures: $4.050 \times 400 \times 0.166$
    A) 269   **B)** 268.9   **C)** 300   **D)** 3×10^2

25) How many ML are in 2.5×10^{-4} L?
    A) 2.5×10^4 ML   **B)** 2.5×10^{-10} ML   **C)** 2.5×10^2 ML   **D)** 2.5×10^{-4} ML

26) How many nm are in 0.0023 cm?
    A) 2.3×10^{-14} nm   **B)** 2.3×10^{-10} nm   **C)** 2.3×10^4 nm   **D)** 2.3×10^9 nm

27) How many kJ are required to heat 2.00 L of water from its freezing point to its boiling point?
    A) 418 kJ   **B)** 4.18×10^5 kJ   **C)** 837 kJ   **D)** 8.37×10^5 kJ

28) It takes 40.4 J to heat a 5.80 g sample of iron by 15.5 °C. What is the specific heat of iron?
    A) 0.449 J/g•°C   **B)** 15.1 J/g•°C   **C)** 108 J/g•°C   **D)** 3.63×10^3 J/g•°C

29) At which of the following temperatures would water molecules be moving the fastest?
    A) 10.0 °F   **B)** 90.0 °F   **C)** 10.0 °C   **D)** 90.0 °C

30) How many m^3 are in 2.50 L?
    A) 2.50×10^{-3} m^3 **B)** 0.250 m^3 **C)** 25.0 m^3 **D)** 2.50×10^3 m^3

31) The speed of sound in dry air is 344 m/s. How fast is this in "inches per minute"?
    A) 226 in/min   **B)** 344 in/min   **C)** 2.06×10^4 in/min   **D)** 8.13×10^5 in/min

32) How many total atoms are there in one unit of $Mg(HSO_4)_2$?
    A) 7   **B)** 11   **C)** 13   **D)** 14

33) What is the molar mass of $Mg(HSO_4)_2$?
    A) 219 g/mol   **B)** 218.5 g/mol   **C)** 218.47 g/mol   **D)** 218.466 g/mol

34) What is the mass % of O in $Mg(HSO_4)_2$?
    A) 7.324 %   **B)** 29.29 %   **C)** 38.52 %   **D)** 58.59 %

35) How many total units are there in 5.0 g of $Mg(HSO_4)_2$?
    A) 1.4×10^{22} **B)** 1.4×10^{23} **C)** 7.4×10^{23} **D)** 3.0×10^{24}

36) How many total atoms are there in 1.0 mol of $Mg(HSO_4)_2$?
    A) 11   **B)** 13   **C)** 14   **D)** 7.8×10^{24}

37) Which of the following compounds has the highest mass % of I?
    A) KIO   **B)** KIO_2 **C)** KIO_3 **D)** KIO_4

38) A sample of $Fe_2(S_2O_3)_3$ is found to contain 4.50 g of S. How much does the sample weigh?
    A) 6.62 g   **B)** 10.5 g   **C)** 29.8 g   **D)** 62.9 g

39) When the following reaction is balanced, what is the coefficient in front of the $TiCl_4$?
$$\underline{\quad\quad} TiCl_4 + \underline{\quad\quad} H_2O \rightarrow \underline{\quad\quad} TiO_2 + \underline{\quad\quad} HCl$$
    A) 1   **B)** 2   **C)** 3   **D)** 4

40) When the following reaction is balanced, what is the coefficient in front of the NH_3?
$$\underline{\quad\quad} NaNO_3 + \underline{\quad\quad} NaNH_2 \rightarrow \underline{\quad\quad} NaN_3 + \underline{\quad\quad} NaOH + \underline{\quad\quad} NH_3$$
    A) 1   **B)** 2   **C)** 3   **D)** 4

41) Solid iron(III) oxide reacts with aluminum to produce solid iron metal and solid aluminum oxide. Assuming 100% yield, how many grams of Fe will be formed if 50.0 g of Al reacts with excess iron(III) oxide?
    A) 45.1 g   **B)** 104 g   **C)** 62.3 g   **D)** 132 g

42) Lead has two naturally occurring isotopes, Pb-207 and Pb-208. Pb-207 has a mass of 207.0 amu and an 80.00% natural abundance. Calculate the atomic mass of Pb-208.
    A) 208.0 amu   **B)** 208.2 amu   **C)** 207.8 amu   **D)** 207.6 amu

43) A mixture of 4.00 moles of hydrogen and 3.00 moles of oxygen is ignited, forming water. What is the maximum amount of water (in grams) that can be formed?
    A) 69.8 g water   **B)** 51.2 g water   **C)** 72.1 g water   **D)** 102 g water

44) If the yield for the following reaction is 85.0%, how many grams of Al_2S_3 should be used to produce 165 g of $Al(OH)_3$? Al_2S_3 (s) + 6 H_2O (l) → 2 $Al(OH)_3$ (s) + 3 H_2S (g)
   A) 187 g   **B)** 145 g   **C)** 98.6 g   **D)** 215 g

45) In addition to $NaNO_3$(aq), what other product forms when Na_2S (aq) is added to HNO_3 (aq)?
   A) HS (aq)   **B)** H_2S (aq)   **C)** HS (g)   **D)** H_2S (g)

46) Which of the following is expected to form when $Mg(NO_3)_2$ (aq) reacts with Na_3PO_4 (aq)?
   A) $MgPO_4$ (s)   **B)** $MgPO_4$ (aq)   **C)** $Mg_3(PO_4)_2$ (s)   **D)** $Mg_3(PO_4)_2$ (aq)

47) Which of the following is expected to result in the formation of a gas when added to HCl?
   A) $K_2S_2O_3$ (aq)   **B)** K_2SO_3 (aq)   **C)** $KHSO_4$ (aq)   **D)** K_2SO_4 (aq)

48) How many moles of O_2 are needed for the complete combustion of 2 moles of C_3H_8?
   A) 4 moles   **B)** 5 moles   **C)** 8 moles   **D)** 10 moles

49) Which of the following pairs of aqueous solutions will give a precipitate when mixed?
   A) $Sr(NO_3)_2$ + KOH   **B)** Li_2SO_4 + K_3PO_4 **C)** $MgCl_2$ + $Pb(NO_3)_2$ **D)** $CuSO_4$ + $Fe(C_2H_3O_2)_3$

50) What description applies to the following reaction: 4 Na(s) + O_2(g) → 2Na_2O(s)
   A) precipitation   **B)** single displacement   **C)** oxidation-reduction   **D)** decomposition

ANSWERS:

1) C	11) D	21) B	31) D	41) B
2) D	12) B	22) C	32) C	42) A
3) B	13) C	23) B	33) C	43) C
4) B	14) C	24) D	34) D	44) A
5) B	15) A	25) B	35) A	45) D
6) D	16) B	26) C	36) D	46) C
7) B	17) C	27) C	37) A	47) B
8) D	18) D	28) A	38) B	48) D
9) D	19) A	29) D	39) A	49) C
10) C	20) B	30) A	40) A	50) C