- To get the most out of this Practice Final Exam, you should work alone and you should not use your textbook or lecture notes.
- Feel free to use a periodic table, scratch paper, and a non-programmable calculator.
- Time yourself and allow yourself 2 hours to finish.
- When you are done with 2 hours, use the answer key on the last page to grade yourself.
- Each question is worth 5 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 mile = 5280 ft	1 gal = 128 fluid ounces	1 ton = 2000 lb
1 mile = 1.609 km	1 gal = 3.785 L	1 mol = 6.022×10^{23} things
K = °C + 273	1 calorie = 4.184 joule (exactly)	Density (water) = 1.00 g/mL
°C = (°F – 32)/1.8	1 Calorie = 1000 calorie	Specific heat (water) = 4.184 J/g°C
		Specific heat (iron) = 0.449 J/g°C

1) A substance has a density of 1.88 lb/qt. What is the mass (in kg) of a 2.5×10^4 cm^3 sample of the substance?
A) 0.98 kg **B)** 53 kg **C)** 37 kg **D)** 23 kg **E)** 12 kg

2) How many total atoms are there in 15 g of copper(II) dihydrogen phosphate?
A) 1.4×10^{26} **B)** 5.3×10^{23} **C)** 8.0×10^{22} **D)** 3.5×10^{22} **E)** 9.0×10^{24}

3) Which of the following is expected to result in the formation of a gas when added to HI (aq)?
A) $Li_2S_2O_3$ (aq) **B)** $KHSO_4$ (aq) **C)** $RbHSO_4$ (aq) **D)** Cs_2SO_4 (aq) **E)** Na_2SO_3 (aq)

4) An aqueous solution of which of the following is not a possible acid?
A) $H_2S_2O_3$ **B)** $H_2Cr_2O_7$ **C)** $H_2C_2O_4$ **D)** H_2CO_3 **E)** H_2BrO_3

5) What is the molar mass (with correct significant figures) for tin(II) hydroxide?
A) 254.4 g/mol **B)** 135.7 g/mol **C)** 152.7 g/mol **D)** 152.72 g/mol **E)** 135.71 g/mol

6) What is the formula for barium arsenate?
A) $Ba_2(AsO_4)_3$ **B)** $BaAsO_4$ **C)** $Ba_3(AsO_4)_2$ **D)** $Ba_2(AsO_3)_3$ **E)** $BaAsO_3$

7) Which of the following lengths is not equivalent to the others?
A) 10^4 Mm **B)** 10^1 Gm **C)** 10^{-2} Tm **D)** 10^{11} dm **E)** they are all equal

8) What is the mass (in μg) of a 1.43×10^{-2} millimole sample of potassium chromate?
A) 1.38×10^3 μg **B)** 2.78×10^3 μg **C)** 2.42×10^2 μg **D)** 6.45×10^2 μg **E)** 5.33×10^3 μg

9) What is the net ionic reaction when $Mg(NO_3)_2$ (aq) reacts with Na_3PO_4 (aq)?
A) $3\ Mg^{+2}(aq) + 2\ PO_4^{3-}(aq) \rightarrow Mg_3(PO_4)_2(aq)$ **B)** $2\ Mg^{+2}(aq) + 3\ PO_4^{3-}(aq) \rightarrow Mg_2(PO_4)_3(s)$
C) $Na^{+}(aq) + NO_3^{-}(aq) \rightarrow NaNO_3(s)$ **D)** $3\ Mg^{+2}(aq) + 2\ PO_4^{3-}(aq) \rightarrow Mg_3(PO_4)_2(s)$
E) $3\ Na^{+}(aq) + PO_4^{3-}(aq) \rightarrow Na_3PO_4(s)$

10) What is the formula for boric acid?
A) HBO_3 (aq) **B)** H_3BO_2 (aq) **C)** H_3BO_3 (aq) **D)** H_2BO_3 (aq) **E)** H_2BO_2 (aq)

11) How many kJ are required to heat 2.00 gallons of water from its freezing point to its boiling point?
A) 3.17×10^3 kJ **B)** 8.37 **C)** 8.37×10^5 kJ **D)** 837 kJ **E)** 4.18×10^5 kJ

12) How many nm^2 are in 4.8 $inches^2$?
A) $5.9 \times 10^{15}\ nm^2$ **B)** $3.1 \times 10^{15}\ nm^2$ **C)** $1.2 \times 10^{8}\ nm^2$
D) $1.2 \times 10^{15}\ nm^2$ **E)** $5.9 \times 10^{8}\ nm^2$

13) Silicon has three naturally occurring isotopes, two of which are Si-28 (27.98 amu) and Si-29 (28.98 amu). If Si-28 has a 92.23% abundance and Si-29 has a 4.68% abundance, what is the mass of the third isotope?
A) 31.99 amu **B)** 30.03 amu **C)** 25.97 amu **D)** 28.50 amu **E)** 26.96 amu

14) What is the formula for hydrophosphoric acid?
A) HP (aq) **B)** H_2PO_3 (aq) **C)** H_3PO_4 (aq) **D)** H_3PO_3 (aq) **E)** H_3P (aq)

15) What is the maximum mass (in g) of Fe that can be made from the reaction of 123 g Fe_2O_3 with excess Al according to the following unbalanced reaction: $\_\_Al + \_\_Fe_2O_3 \rightarrow \_\_Al_2O_3 + \_\_Fe$
A) 86.0 g **B)** 43.0 g **C)** 344 g **D)** 172 g **E)** 21.5 g

16) What is the coefficient in front of H_2O after balancing: $\_Ca_3P_2(s) + \_H_2O(l) \rightarrow \_Ca(OH)_2(s) + \_PH_3(g)$
A) 6 **B)** 4 **C)** 2 **D)** 7 **E)** 1

17) Calculate the percent yield if 52.9 g $KClO_3$ react with excess P_4 to produce 25.0 g P_4O_{10} according to the following unbalanced reaction: $\_\_\_ KClO_3 + \_\_\_ P_4 \rightarrow \_\_\_ P_4O_{10} + \_\_\_ KCl$
A) 68.0 % **B)** 46.5 % **C)** 23.9 % **D)** 84.4 % **E)** 20.4 %

18) A sample of nitric acid has 8.0×10^{23} atoms. How much does the sample weigh (in g)?
A) 84 g **B)** 17 g **C)** 51 g **D)** 0.27 g **E)** 4.1×10^2 g

19) What is the name for K_2O?
A) potassium(II) oxide **B)** potassium monoxide **C)** potassium(I) monoxide
D) potassium oxide **E)** potassium(I) oxide

20) In addition to $NaNO_3$(aq), what other product is formed when Na_2S (aq) is mixed with HNO_3 (aq)?
A) H_2S (aq) **B)** SO_2(aq) **C)** H_2S (g)
D) HS (aq) **E)** SO_2(g)

21) What is the mass % (to 3 sig figs) of O in potassium carbonate?
A) 11.6 % **B)** 34.7 % **C)** 16.1 % **D)** 38.5 % **E)** 20.9 %

22) How many significant figures are in the answer to the following calculation: (8.05 + 5.8)/0.166
A) 3 **B)** 4 **C)** 2 **D)** 6 **E)** 5

23) What is the name of Zn_3N_2?
A) zinc(III) nitride **B)** trizinc dinitride **C)** zinc(II) nitride
D) zinc nitrite **E)** zinc nitride

24) How many moles of O_2 are needed for the complete combustion of 2 moles of C_3H_8?
A) 10 moles **B)** 8 moles **C)** 5 moles **D)** 4 moles **E)** 6 moles

25) Identify the limiting reactant and the mass (in g) of NO formed when 30.00 g NH_3 and 40.00 g O_2 react according to the following unbalanced reaction: $\_\_NH_3(g) + \_\_O_2(g) \rightarrow \_\_NO(g) + \_\_H_2O(g)$
A) NH_3 is limiting; 42.01 g NO made **B)** NH_3 is limiting; 30.01 g NO made
C) O_2 is limiting; 39.01 g NO made **D)** O_2 is limiting; 30.01 g NO made
E) NH_3 is limiting; 39.01 g NO made

26) What is the name for HIO_2 (aq)?
A) hydriodic acid **B)** iodic acid **C)** iodite acid **D)** iodous acid **E)** hydroiodine acid

27) A 0.50-mole sample of piece of iron was heated to 125 °C. The hot piece of metal was then dropped in 3.0-mole sample of water. The final temperature of the iron/water is 31 °C. What was the original temperature of the water?
A) 38 °C **B)** 26 °C **C)** 18 °C **D)** -11 °C **E)** 9.3 °C

28) What is the isotope symbol for an atom of chromium that has 30 neutrons?
A) $^{52}_{30}Cr$ **B)** $^{30}_{52}Cr$ **C)** $^{54}_{24}Cr$ **D)** $^{30}_{24}Cr$ **E)** $^{54}_{30}Cr$

29) How many sig figs are in the answer to the following calculation: (120.90)(0.55) + (122.90)(0.45)
A) 3 **B)** 4 **C)** 2 **D)** 5 **E)** 1

30) What is the formula for silver dihydrogen phosphate?
A) AgH_2PO_4 **B)** $AgHPO_4$ **C)** $Ag_2H_2PO_3$ **D)** $Ag_2H_2PO_4$ **E)** $Ag(H_2PO_4)_2$

31) What description applies to the following reaction: $4\ Na(s) + O_2(g) \rightarrow 2\ Na_2O(s)$
A) oxidation-reduction **B)** single displacement **C)** acid base reaction
D) double displacement **E)** precipitation

32) 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 $Al(OH)_3$? $Al_2S_3\ (s) + 6\ H_2O\ (l) \rightarrow 2\ Al(OH)_3\ (s) + 3\ H_2S\ (g)$
A) 145 g **B)** 215 g **C)** 90.3 g **D)** 98.6 g **E)** 187 g

33) At which of the following temperatures would water molecules be moving the fastest?
A) 50.0 K **B)** -50.0 °C **C)** 50.0 °C **D)** -50.0 °F **E)** 50.0 °F

34) Which of the following is the largest volume?
A) 5 gal **B)** 5 pt **C)** 5 qt **D)** 5 L **E)** 5 cm^3

35) Which of the following conversion factors does <u>not</u> have an infinite number of significant figures?
A) 1 kg/2.205 lb **B)** 1 hr/3600 sec **C)** 1 mile/5280 ft **D)** 1 cal/4.184 J **E)** 1 in/2.54 cm

36) The speed of sound in dry air is 344 m/s. How fast is this in "km/hr"?
A) 95.6 km/hr **B)** 55.8 km/hr **C)** 0.344 km/hr **D)** 20.6 km/hr **E)** 1.24×10^3 km/hr

37) How many electrons does the tin ion in $Sn(CN)_4$ have?
A) 50 **B)** 46 **C)** 52 **D)** 54 **E)** 48

38) What is the name for $Ni(HSO_3)_2$?
A) nickel(II) hydrogen sulfite **B)** nickel hydrogen sulfate **C)** nickel(II) hydrogen sulfate
D) nickel hydrogen sulfite **E)** nickel(III) hydrogen sulfate

39) What is the formula of the solid that is formed when an aqueous solution of iron(III) chloride is added to an aqueous solution of silver acetate?
A) $Fe(C_2H_3O_2)_3$ **B)** $Ag(C_2H_3O_2)_2$ **C)** $FeCl_3$ **D)** $AgCl$ **E)** $AgCl_2$

40) Which of the following gives the formula of a possible ionic compound?
A) Al_3N_2 **B)** $ZnClO_4$ **C)** NH_4Cl **D)** $KHPO_4$ **E)** P_2O_4

ANSWERS:

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