Practice Exam

Printed Name: _____

Student Number: _____

Signature: _____

CHEMISTRY 1410 FIRST EXAM 100 POINTS

Each multiple choice question is worth 3 points. Read each question very carefully. The four numerical questions on the exam are worth 10 points each. Be sure to show your work on the numerical problems as partial credit will be based upon the work shown. **NOTE: TO RECEIVE PARTIAL CREDIT FOR ANY NUMERICAL PROBLEM, THE WORK SHOWN MUST BE CONSISTENT WITH THE ANSWER GIVEN!!**

MULTIPLE CHOICE: (60 Points) Each of following twenty multiple choice questions is worth 3 points. Circle the correct response.

QUESTION 1: Which of the following statements is <u>not</u> true?

(a) There are 1000 centimeters in 10 meters.

(b) There are 1000 grams in 1 kilogram.

(c) There are 10^{-5} centimeters in 1 kilometer.

(d) There are 10^{6} milligrams in 1 kilogram.

(e) There are 10^{-6} kilograms in 1 milligram.

Question 2: Which of the following numerical values do not contain four significant figures?

(a) 3.004

(b) 0.002031

(c) 1.000×10^{4}

(d) 2300

(e) 1200.

QUESTION 3: How many significant figures would be allowed in the numerical value obtained from the following calculation:

$$12.1233 + 0.1234 + 0.1434 - 10.12 =$$

(a) The answer would contain two significant figures.

(b) The answer would contain three significant figures.

(c) The answer would contain four significant figures.

(d) The answer would contain five significant figures.

(e) None of the above statements are true.

QUESTION 4: How many significant figures would be allowed in the numerical value obtained from the following calculation:

$$(15.1234 - 2.43)/(16.12 + 1.234)$$

(a) The answer would contain two significant figures.

(b) The answer would contain three significant figures.

(c) The answer would contain four significant figures.

(d) The answer would contain five significant figures.

(e) None of the above statements are true.

QUESTION 5: The temperature of 92.0 °C corresponds to:

(a) 197.6 °F

(b) 399.2 K

(c) 83.4 °F

(d) 221 K

(e) 133.6 °F

QUESTION 6: Rutherford is best remembered for:

(a) discovery of the neutron.

(b) discovery of the proton.

(c) discovery of the nucleus.

(d) discovery of the electron.

(e) discovery of the alpha particle.

QUESTION 7: What is the molecular formula of the ionic compound formed from Al^{3+} and $Cr_2O_7^{2-}$ ions?

(a) $AlCr_2O_7$

(b) $Al_2(Cr_2O_7)_3$

(c) $Al_3(Cr_2O_4)_2$

(d) $(Cr_2O_7)_2Al_3$

(e) None of the above formulas are correct.

QUESTION 8: How many electrons are there in C_4H_8?

(a) 30

(b) 56

(c) Cannot be determined from the information given

(d) 32

(e) None of the above answers are correct.

QUESTION 9: Cu is the formula of

(a) Carbon

(b) Copper

(c) Cobalt

(d) Chromium

(e) Carbon monoxide

QUESTION 10: $^{59}_{28}Ni^{2+}$ denotes a

(a) Nickel anion having 28 protons, 31 neutrons and 26 electrons

(b) Nickel atom having 28 protons, 31 neutrons and 26 electrons

(c) Niobium atom having 28 protons, 31 neutrons and 26 electrons

(d) Nickel cation having 28 protons, 31 neutrons and 26 electrons

(e) Niobium cation having 28 protons, 31 neutrons and 26 electrons

QUESTION 11: The compound $(NH_4)_2(PO_4)_3$ contains:

(a) two nitrogen atom, 8 hydrogen atoms, 3 potassium atoms and 12 oxygen atoms.

(b) two nitrogen atoms, 8 hydrogen atoms, 3 phosphorus atoms and 12 oxygen atoms.

(c) two natrium atoms, 8 hydrogen atoms, 3 potassium atoms and 12 oxygen atoms.

(d) two nitrogen atoms, 8 hydrogen atoms, 3 platinum atoms and 12 oxygen atoms.

(e) two nickel atoms, 8 hydrogen atoms, 3 phosphorus atoms and 12 oxygen atoms.

QUESTION 12: What is the molecular formula for dinitrogen trioxide?

(a) N_5O_2

(b) NO_2

(c) N_2O

(d) N_2O_3

(e) N_2O_5

QUESTION 13: Which of the following is an example of a heterogeneous mixture?

(a) fine grains of clay dispersed in water.

(b) silver metal

(c) a teaspoon of table salt dissolved in a gallon of coffee

(d) a teaspoon of sugar dissolved in a gallon of coffee

(e) None of the above answers are correct.

QUESTION 14: How many moles of NaOH are there in 120 grams of NaOH?

(a) 1.5

(b) 2

(c) 2.5

(d) 3

(e) 3.5

QUESTION 15: What is the molar mass of $CrSO_4 \cdot 5\ H_2O$?

(a) 159.62

(b) 206.00

(c) 123.00

(d) 2087.93

(e) 238.03

QUESTION 16: How many molecules is present in 0.085 moles of acetylene?

(a) 52.12×10^{22}

(b) 1.41×10^{-25}

(c) 5.12×10^{22}

(d) 3.16×10^{22}

(e) Cannot be determined without knowing the molecular formula of acetylene.

QUESTION 17: How many grams of carbon dioxide, CO_2, can be produced from the burning of 132.48 grams of butane gas in an excess of oxygen: The balanced chemical reaction is:

$$C_4H_{10(gas)} + 13/2\ O_{2(gas)} \longrightarrow 4\ CO_{2(gas)} + 5\ H_2O_{(liq)}$$

(a) 164.3 grams

(b) 401.7 grams

(c) 100.4 grams

(d) 704.2 grams

(e) 132.48 because you cannot destroy or create mass

QUESTION 18: What is the percent composition (by mass) of Na in Na_2O?

(a) 42.5 %

(b) 74.2 %

(c) 40.0 %

(d) 57.5 %

(e) 66.6 %

QUESTION 19: What are the coefficients needed to balance the following chemical reaction:

_____ C_5H_6O + _____ O_2 -----> _____ CO_2 + _____ H_2O

(a) 1, 6, 5, 3

(b) 1, 5, 4, 2

(c) 2, 5, 8, 10

(d) 1, 5, 6, 4

(e) None of the above answers are correct

QUESTION 20: Assume that only two isotopes of copper occur naturally, Copper-63 (mass = 62.9298 am, abundance of 75.0 %) and Copper-65 (mass = 64.9278 amu, abundance of 25.0 %). From the information given, calculate the average atomic mass of copper. **(Note: The answer will be different than what is given on the periodic table because I have changed the relative abundancies of the two isotopes.)**

(a) 63.93

(b) 63.15

(c) 64.43

(d) 63.43

(e) None of the above answers are correct.

NUMERICAL QUESTIONS:
Each numerical question is worth 10 points.

QUESTION 21: The distance between Denton and Dallas is 40 miles. What is the distance between Denton and Dallas in kilometers?

Information given: 1 mile = 5,280 feet 1 inch = 2.54 cm

QUESTION 22: A cube of ruthenium metal is 1.5 cm on a side has a mass of 142.0 grams. What is the density in grams/cm^3?

QUESTION 23: 30.0 grams acetylene gas (C_2H_2) is allowed to react with 40.0 grams of oxygen gas (O_2) according to the following balanced chemical reaction:

$$2\ C_2H_{2(gas)} + 5\ O_{2(gas)} \longrightarrow 4\ CO_2 + 2\ H_2O$$

(a) What is the limiting reagent for the conditions given above

(b) How many grams of H_2O can be theoretically produced under the above conditions?

QUESTION 24: A compound containing only phosphorous and oxygen contains 43.64 % P by mass. Determine the simple empirical formula of the compound.

IA	IIA	IIIB	IVB	VB	VIB	VIIB	VIIIB			IB	IIB	IIIA	IVA	VA	VIA	VIIA	VIIIA
1 H 1.01																	2 He 4.00
3 Li 6.94	4 Be 9.01											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
11 Na 23.00	12 Mg 24.31											13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.06	17 Cl 35.45	18 Ar 39.95
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.88	23 V 50.94	24 Cr 51.97	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.38	31 Ga 69.72	32 Ge 72.59	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc (98)	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.69	51 Sb 121.75	52 Te 127.60	53 I 126.90	54 Xe 131.29
55 Cs 132.91	56 Ba 137.33	57 *La 138.91	72 Hf 178.49	73 Ta 180.94	74 W 183.85	75 Re 186.21	76 Os 190.20	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.20	83 Bi 208.98	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra 226.03	89 †Ac 227.03	104 Unq§ (261)	105 Unp§ (262)	106 Unh§ (263)												

* Lanthanides													
58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.04	71 Lu 174.97

† Actinides													
90 Th	91 Pa 231.04	92 U 238.03	93 Np 237.05	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (260)