

Unless otherwise specified, each question is worth 5 points.

1. Identify strong, weak, or non electrolytes.
2. Calculate moles in a solution.
3. Identify compounds as soluble or insoluble in water.
4. Write balanced net ionic equations for precipitation reactions, given the reactants.
5. Write balanced net ionic equations for acid-base reactions, given the reactants.
6. Identify weak or strong acids or bases.
7. Identify elements reduced/oxidized & reducing/oxidizing agents in redox reactions.
8. Balance redox reactions in aqueous, acidic solutions.
9. Convert between different pressure units.
10. Perform calculations using the Ideal Gas Law.
11. Stoichiometry using the Ideal Gas Law.
12. Explain or define Pressure, Temperature and Volume in terms of the Kinetic Molecular Theory of Gases.
13. Generally describe how acid rain is formed in the atmosphere as a result of fossil fuel combustion.
14. Calculate change of internal energy based on heat exchanged and gas expansion/contraction work.
15. Calculate heat of reaction (q_{reaction}) based on a change in temperature of surrounding water in a coffee cup calorimeter.
16. Perform calculations involving $\Delta H_{\text{reaction}}$ & ΔT associated with chemical reactions occurring in a coffee cup calorimeter (like we did in lab).
17. Use Hess' law to find $\Delta H_{\text{reaction}}$.
18. Use standard heats of formation to find $\Delta H^{\circ}_{\text{reaction}}$.
19. List two significant reasons to support the argument that it would be a good idea to stop using petroleum as a major component of energy supply in the near future. In a sentence or two, explain your reasoning for each of your choices.
20. Perform calculations involving enthalpies of combustion associated with coal, natural gas, and "gasoline" to find "best" and "worst" fuel choices in terms of energy and/or $\text{CO}_2(\text{g})$ produced.

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Generic Grading Rubric for Chemistry @ LTCC: (rev. 11/21/08)

In general, incorrect answers will be assigned pro-rated partial credit proportional to the amount of the supporting work that is correct. Pro-rated points will typically be rounded to whole numbers. Other deductions will be assigned per question as described below:

- a) any combination of wrong significant figures and/or missing or incorrect units and/or "dumb" math error(s)..... -1 point
- b) no answer provided / blank-100%
- c) incorrect answer; no work shown.....-100%
- d) correct answer, but no supporting work is shown when complex, multi-step calculations are required (*This looks suspiciously like cheating.*)-100%
- e) completely incorrect concept or approach, but some correct calculations associated with this type of problem are shown..... - ~60-80%
- f) description and/or outline of correct approach or concept, but calculations performed or answers calculated are missing or incomplete - ~30-40%

EXAM SCORE: _____ points / 100

OVERALL SCORE (*as of Dec. 1, 2008*): _____points / 430*
with lowest lab report, lowest homework set, AND lowest quiz score dropped. (*9(-1) lab reports + 6(-1) homework sets + 5(-1) quizzes + 2 exams = 80 + 50 + 100 + 200 = 430**)

OVERALL LETTER GRADE POINT BREAKDOWN (*as of Dec. 1, 2008*)
A=387-430; B=344-386; C=301-343; D=258-300; F=<258 points

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Abbreviated Periodic Table of the Elements

1 1A 1 H 1.01	2 2A 4 Li 6.94												13 3A 5 B 10.81	14 4A 6 C 12.01	15 5A 7 N 14.01	16 6A 8 O 16.00	17 7A 9 F 19.00	18 8A 2 He 4.00
11 Na 22.99	12 Mg 24.31	3 3B	4 4B	5 5B	6 6B	7 7B	8 8B	9 8B	10 8B	11 1B	12 2B	13 3A 13 Al 26.98	14 4A 14 Si 28.09	15 5A 15 P 30.97	16 6A 16 S 32.07	17 7A 17 Cl 35.45	18 8A 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 52.00	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 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3	
55 Cs 132.9	56 Ba 137.3	57 La* 138.9	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)	
87 Fr (223)	88 Ra 226	89 Ac** (227)	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Uun	111 Uuu	112 Uub							

POSSIBLY HELPFUL INFORMATION:

$$R \text{ (gas constant)} = 0.08206 \left(\frac{\text{L}\cdot\text{atm}}{\text{mol}\cdot\text{K}} \right)$$

$$K = ^\circ\text{C} + 273.15$$

$$1 \text{ atm} = 760 \text{ mmHg} = 760 \text{ torr}$$

$$1 \text{ L}\cdot\text{atm} = 101.333 \text{ J}$$

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Water Solubility Rules (ref. Table 4.1, p. 144, *Chemistry, seventh edition*, Zumdahl & Zumdahl)

Note that there may be a number of exceptions to these rules, and/or there are more subtle classifications ("partially soluble", "somewhat soluble", "marginally soluble", etc.), but these are the rules that we will use in CHM 101.

0. Any ionic compound that is indicated as aqueous(aq), should be considered water soluble for CHM 101.
1. *(Required memorization)*
2. *(Required memorization)*
3. Most chloride, bromide, and iodide salts are soluble. EXCEPTIONS (for CHM 101): chloride, bromide, and iodide salts containing Ag^+ , Pb^{2+} , and Hg_2^{2+} are INSOLUBLE.
4. Most sulfate salts are soluble. EXCEPTIONS (for CHM 101): BaSO_4 , PbSO_4 , Hg_2SO_4 , and CaSO_4 , are INSOLUBLE.
5. Most hydroxide salts are insoluble, unless rule #2 applies to the compound.
6. Most sulfide (S^{2-}), carbonate (CO_3^{2-}), chromate (CrO_4^{2-}), and phosphate (PO_4^{3-}) salts are insoluble, unless rule #2 applies to the compound.

SOME of the Rules for ASSIGNING OXIDATION NUMBERS: (ref. Table 4.2, p. 156, *Chemistry, seventh edition*, Zumdahl & Zumdahl)

1. *(required memorization)*
2. *(required memorization)*
3. **fluorine = -1** (HF , CF_4 , ...)
4. **oxygen = -2** (H_2O , CO_2 , ...); except peroxide = $\text{O}_2^{2-} = -1$ (H_2O_2 , NaO ,...)
5. **hydrogen = +1** (H_2O , NH_3 ,...)
6. *(required memorization)*
7. *(required memorization)*

SOME of the steps for Balancing Oxidation-Reduction ("Redox") Reactions (ref. chapter 4, section 4.10, *Chemistry, seventh edition*, Zumdahl & Zumdahl)

- 2a. balance all elements other than O & H
- 2b. balance O with H_2O
- 2c. balance H with H^+
- 2d. balance charge with electrons (e^-)