Name: _____ Test 3

130 points Chemistry 121A

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SHOW ALL CALCULATIONS & USE PROPER SIGNIFICANT FIGURES AND UNITS

Multiple Choice Questions: Circle the single best answer. No penalty for guessing.

1. How many valence electrons does N have? (8 points)

A) 3 **B)** 4 **C)** 5 **D)** 8 **E)** 14

2. Which of the following atoms has the smallest **first** ionization energy? (8 points)

A) Na **B)** K **C)** Rb **D)** Mg **E)** Al

3. What is the highest energy occupied atomic orbital in the ground state electron configuration of iron (Fe)? (8 points)

A) 1s **B)** 2s **C)** 3d **D)** 4f **E)** 5p

4. What is the mass percentage of oxygen in HNO_3? (8 points)

A) 20.0 % **B)** 25.3 % **C)** 50.0 % **D)** 60.0 % **E)** 76.2 %

5. The heat of combustion of methane is –721 kJ/mol. What is the temperature change in 100.0 g of water if 0.0200 mol of methane are burned to heat the water (C_{water} = 4.184 J / g K)? (8 points)

A) 3.44 K **B)** 14.4 K **C)** 34.5 K **D)** 86.2 K **E)** 141.2 K

6. What is the hybridization of the O atom in H_2CO? (8 points)

A) sp **B)** sp^2 **C)** sp^3 **D)** sp^3d **E)** 2p

7. Draw the Lewis dot structures for CH_4 and PF_3O. Remember to include formal charges (12 points)

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8. Write the formula or name of the following ionic compounds and indicate the solubility. (24 points)

Na_2SO_4	_____	_____
$CaCO_3$	_____	_____
_____	perchloric acid	_____
_____	ammonium permanganate	_____

9. Draw the Lewis dot structure for SO_2^{2-}. Describe the molecular and electron pair geometry as well as formal charge and oxidation state for each atom of this molecule. (16 points)

10. Arrange the following atoms in order of electronegativity from highest to lowest: K, Cl, B, Fe, Ba. (15 points)

11. Calculate the mass of $AlCl_3$ produced when 5.00 g of Al is reacted with 5.00 g of Cl_2. (15 points)