

Name: \_\_\_\_\_

130 points

Dr. Jay H. Baltzberger

Test 3

Chemistry 121A

December 8, 1997

**SHOW ALL CALCULATIONS & USE PROPER SIGNIFICANT FIGURES AND UNITS**

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

- How many valence electrons does Si have? (5 points)  
A) 3                      B) 4                      C) 5                      D) 8                      E) 14
- What is the molecular geometry of H<sub>2</sub>O? (5 points)  
A) tetrahedral      B) square planar      C) bent                      D) trigonal                      E) linear
- Which of the following atoms has the largest **second** ionization energy? (5 points)  
A) Na                      B) K                      C) Rb                      D) Mg                      E) Al
- Which is the highest energy orbital in an atom of Pb? (5 points)  
A) 1s                      B) 2s                      C) 3d                      D) 4f                      E) 5p
- Which compound has a molecular weight of 34 g/mol? (5 points)  
A) NaCl                      B) H<sub>2</sub>O<sub>2</sub>                      C) H<sub>2</sub>O                      D) CO<sub>2</sub>                      E) HNO<sub>3</sub>
- Which of the following sulfate compounds is insoluble in water? (5 points)  
A) Na<sub>2</sub>SO<sub>4</sub>                      B) FeSO<sub>4</sub>                      C) Li<sub>2</sub>SO<sub>4</sub>                      D) MgSO<sub>4</sub>                      E) Hg<sub>2</sub>SO<sub>4</sub>
- What is the bond order for N<sub>2</sub>? (5 points)  
A) 0                      B) 1                      C) 2                      D) 3                      E) 4
- Draw the Lewis dot structures and give oxidation numbers of all atoms for SO<sub>3</sub><sup>2-</sup> and H<sub>2</sub>CO. (15 points)

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9. Write the formula or name of the following ionic compounds and indicate the solubility. (16 points)

$\text{Ca}(\text{ClO}_4)_2$	_____	_____
$\text{Li}_2\text{Cr}_2\text{O}_7$	_____	_____
_____	nitric acid	_____
_____	ammonium fluoride	_____

10. Explain why the bonding molecular orbital ( ) in  $\text{H}_2$  is lower in energy than the anti-bonding orbital ( \*). (15 points)

11. Draw the Lewis dot structure for  $\text{NO}_3^-$ . Describe the molecular and electron pair geometry as well as formal charge on each atom of this molecule. (10 points)

12. Calculate the bond order for the molecule  $\text{H}_2^-$ . Is this a stable molecule? Why? (10 points)

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13. Explain why the first ionization energy of nitrogen atoms is higher than the first ionization energy of oxygen atoms. (10 points)
14. Calculate the amount of  $\text{CO}_2$  produced when 5.00 g of  $\text{C}_6\text{H}_6$  is burned to produce  $\text{CO}_2$  and  $\text{H}_2\text{O}$  in excess  $\text{O}_2$ . (10 points)
15. Balance the following equation and write out a final net ionic equation. (9 points)
- $$\text{CaBr}_2(aq) + \text{Na}_3\text{PO}_4(aq) \rightarrow \text{_____} + \text{_____}$$