Question 1
4 Points

Give the correct chemical name for the following ionic compounds.

1. $FeCO_3$ _____
2. NH_4NO_2 _____
3. $Mg(ClO_4)_2$ _____
4. $BaSO_4$ _____

Question 2
4 Points

When the following chemical equations are balanced using the smallest possible integer coefficients, the values of these coefficients are:

1. __ $NO(g)$ + __ $O_2(g)$ = __ $NO_2(g)$
2. __ $Fe_2O_3(s)$ + __ $C(s)$ = __ $Fe(s)$ + __ $CO_2(g)$

Question 3
6 Points

1. What is the complete electron configuration for the following:

   sulfur atom: _____

   fluoride ion: _____

2. What is the valence electron configuration for the following:

   calcium atom: _____

   sulfide ion: _____

3. A main group element with a valence electron configuration $3s^2 3p^1$ is in group _____ .

Question 4
3 Points

From the following list, circle **one** element (if there is one) that is diamagnetic.

Li Be B C N O F Ne

Question 5
4 Points

Chlorine has two naturally occurring isotopes:

	Exact Mass	**Abundance**
$^{35}_{17}Cl$	34.968853 amu	75.77%
$^{37}_{17}Cl$	36.965903 amu	24.23%

What is the average atomic mass of Cl?

Average Atomic Mass: _____

Question 6 (5 Points) A compound is found to contain:

49.413% K 20.259% S 30.330% O

The empirical formula for this compound is?

Empirical formula: _____

Question 7 (6 Points) Consider the following elements:

Si S Cl Al P

1. Which element would you expect to have the smallest atomic radius? Cl
2. Which element would you expect to have the greatest metallic character? Al
3. Which element would you expect to have the largest ionization energy? Cl

Question 8 (4 Point) Answer the following based on the Lewis Dot Structure for O_3

1. Number of lone pairs on the central O atom is: _____
2. The central O atom forms ___ single bond(s).
3. The central O atom forms ___ double bond(s).
4. The Lewis structure has two or more resonance structure. *(Circle)* **True** **False**

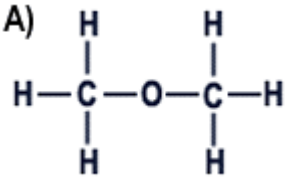
Question 9 (4 Points) Some typical bond energies in kJ per mole are listed below:

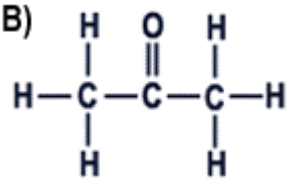
C-O	351	Cl-Cl	243
C=O	803	C-Cl	330
C≡O	1075		

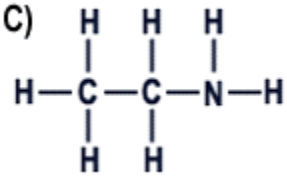
Use these values to determine the enthalpy change for the following reaction:

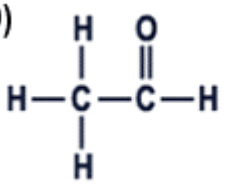
$CO(g) + Cl_2(g) = COCl_2(g)$

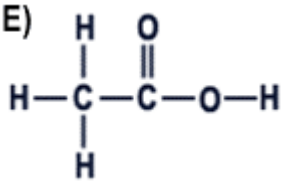
Question 10
8 Points

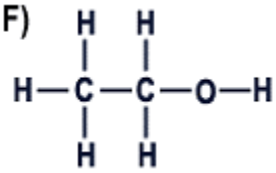
A) 

B) 

C) 

D) 

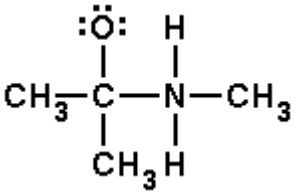
E) 

F) 

The questions below refer to the structural formulas given above for some organic molecules. Give the letter of the structure that depicts:

1.	An alcohol	F	5.	A ketone	B
2.	An amine	C	6.	An ether	A
3.	A carboxylic acid	E	7.	Greatest number of lone pairs	E
4.	An aldehyde	D	8.	Greatest number of bond pairs	B

Question 11
3 Points



The molecule depicted on the left is an unstable intermediate in an organic reaction.
What is the formal charge on:

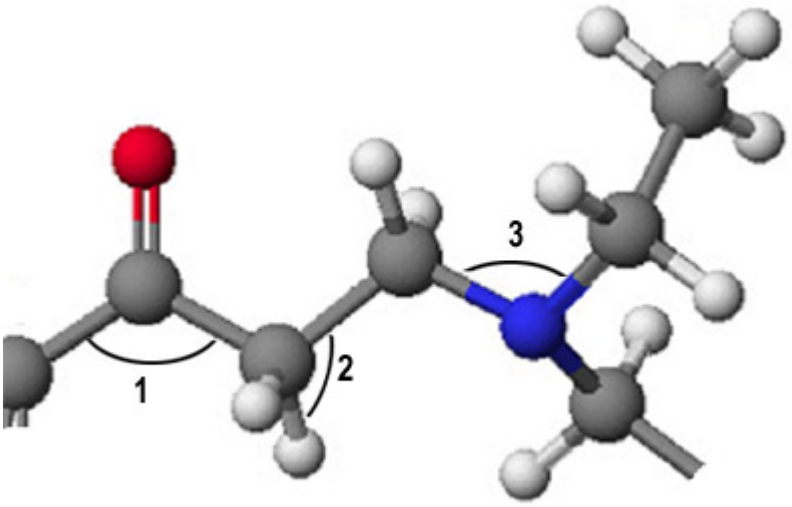
1. The oxygen atom. _____

Question 12
8 Points

Give the Electron Pair Geometry (epg) and the Molecular Geometry (mg) for the following molecules:

1.	CF_4	epg:	_____	mg:	_____
2.	NCl_3	epg:	_____	mg:	_____
3.	NO_2^-	epg:	_____	mg:	_____
4.	H_2O	epg:	_____	mg:	_____

Question 13
3 Points



A portion of the molecule Novocain is depicted on the left. What are the bond angles about 1, 2 and 3?

1. _____

2. _____

3. _____

Question 14 (5 Points) The molecular geometry for the following five molecules is given below. Label these molecules as either Polar or Non Polar.

1. CF_4 Tetrahedron _____
2. CH_2Cl_2 Tetrahedron _____
3. H_2CO Trigonal Planar _____
4. N_2 Linear _____
5. HCN Linear _____

Question 15 (6 Points) Classify each of the following substances:

1. HF _____ A) Strong Acid
2. NaI _____ B) Weak Acid
3. NH_3 _____ C) Strong Base
4. HCl _____ D) Weak Base
5. NaOH _____ E) Soluble Salt
6. $Cr_3(PO_4)_2$ _____ F) Insoluble Salt

Question 16 (3 Points) The $[H^+]$ in an aqueous solution is found to be 5.43×10^{-9}M.

1. The pH of this solution is: _____
2. The $[OH^-]$ of this solution is: _____
3. The solution is (circle one) Basic Acidic Neutral

Question 17 (3 Points) What is the expected pH of an aqueous solution of 0.622M hydrocyanic acid (HCN) at 25^0C? Ka HCN = 4.0×10^{-10} at 25^0C.

pH: _____

Question 18 (4 Points) Give the net ionic equation for the following reactions:

1. $NaOH(aq) + HNO_2(aq)$ _____
2. $NH_3(aq) + HCl(aq)$ _____

Question 19
5 Points

The addition of 0.012 moles of HBr to a 1L buffer solution made from 0.316M HF and 0.204M NaF would result in:

1.	pH	Increase	Decrease	No Change
2.	$[H_3O^+]$	Increase	Decrease	No Change
3.	$[F^-]$	Increase	Decrease	No Change
4.	$[HF]/[F^-]$	Increase	Decrease	No Change

5. The maximum amount of HBr that this buffer could withstand is _____ moles.

Question 20
4 Points

The reaction $H_2(g) + I_2(g) \Leftrightarrow 2HI(g)$ $K = 55.6$ $\Delta H^0 = -10$ kJ/mol @ 696K.

1.	The reaction is product favored.	True	False

The production of HI(g) is favor by:

1.	Decreasing the temperature.	True	False
2.	Decreasing the volume.	True	False
3.	Adding I_2	True	False

Question 21
8 Points

How many grams of solid **sodium hydroxide** are needed to exactly neutralize **27.6** mL of a **1.68** M **sulfuric acid** solution? Assume that the volume remains constant.