Polytechnic Tutoring Center

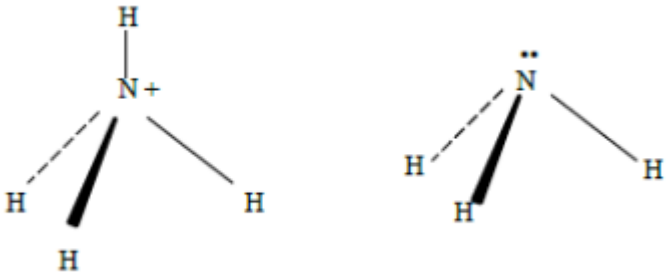
Midterm II REVIEW – CM 1004, Fall 2020

Disclaimer: **This mock exam is only for practice**. *It was made by tutors in the Polytechnic Tutoring Center and is not representative of the actual exam given by the Academic Department.*

The correct answer may not seem apparent and this is only to try and attempt to help you check your own answers. For the actual detailed solution to each question please watch explanation video where we will go over each question in detail with steps explained.

Answer Key

Section 1: LONG ANSWERS



1. Bond angle109 Bond angles: 107.7

NH4+ is tetrahedral, NH3 is trigonal pyramidal molecular geometry and tetrahedral electron geometry.

2.

	Ion-Ion	Dipole-Dipole	London	Hydrogen Bonding	Ion-Dipole
I_2			X		
SO_2		X	X		
CH_3CH_2OH		X	X	X	
CH_3OCH_3			X		
KBr (aq)	X	X	X	X	X

3. Use q = mst to find heat gained by the water. Solve for the final temperature of the plate using t=q/ms, plugging in values for the plate. 109.74 C
4. Looking on the periodic table the elements are:
    a. magnesium
    b. nitrogen
    c. Bromine
    d. Beryllium
    e. Neon
    f. phosphorus

    Knowing this it becomes simple to arrange them by the rules of electronegativity, atomic radius and ionization energy:

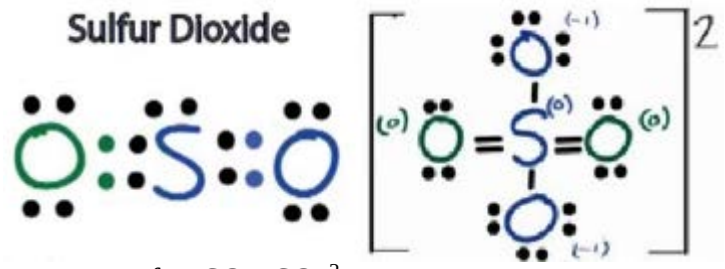
    b) B is lowest C would be highest

    c) B highest, A lowest

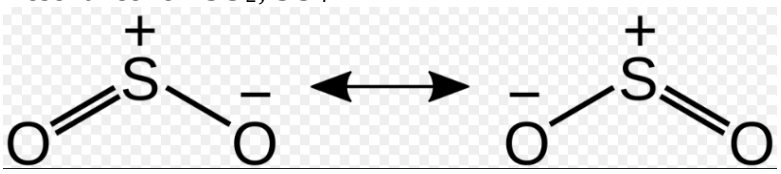
    d) Mg = [Ne] 3s2
    N = [He] 2s2 2p3
    Br = [Ar] 4s2 3d10 4p5
    B = [He] 2s2
    Ne = [Ne]

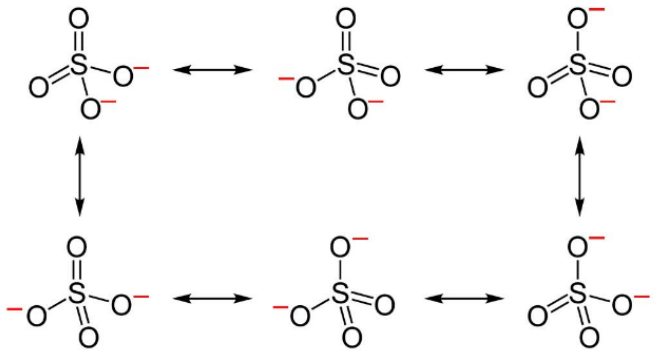
P = [Ne] 3s2 3p3

5. Bond lengths: $SO_4^{2-} > SO_2$



Resonance for SO_2, SO_4^{2-}





Section 2: Multiple choice

1. C, exothermic reactions release heat
2. A, rearrange each equation to cancel out terms to the final reaction, adding up corresponding ΔH^o_f
3. E, 2 in s orbital, 4 in d orbital. All unpaired is paramagnetic.Half fill&fully filled
4. C, products minus reactants
5. B, $q=ms\Delta t$
6. C, count 8 down the row past Kr
7. B, full f orbital, partially filled d
8. E, same number of electron, the one with less proton will have larger size.
9. B, although halogens have the highest electronegativity, He take the most to ionize
10. A, oxidation loses electron while reduction gains electron
11. B, Fluorine is the highest following the trend
12. C, single bonds in C are sp3, double are sp2, triple are sp
13. C, water has lone pairs while carbon dioxide does not
14. A, Xe has two bonds with F and 3 lone pairs
15. E, definition of Trigonal Bipyramidal, 3 lone pairs and two bonds
16. B, linear hydrocarbons have stronger Van der Waal force.