# EASY PACKET 1

Team ID: _____

1. Write the balanced chemical equation for the combustion of hexane ($C_6H_{14}$)

2. What are the reducing and oxidizing agents for the following reaction: 2 $CuSO_4$ + 4 KI → 2 CuI + $I_2$ + 2 $K_2SO_4$

3. How many moles are there in a 49 gram sample of $CH_3OH$? Round your answer two decimal places?

**EASY PACKET 2** Team ID: _____

1. Arrange the following atoms in order of increasing electronegativity: Na, P, S

2. Draw the lewis structure for $H_2SO_4$

3. Rank the following atoms and ions in order of decreasing first ionization energy:
$Li^+$, $Li^-$, Li

# EASY PACKET 3

Team ID: _____

1. What is the molecular shape (VSEPR) of $CO_3^{2-}$

2. Identify a Brønsted-Lowry conjugate acid base pair in the following reaction:

   $C_6H_5COOH(aq) + H_2O(l) \rightarrow C_6H_5COO^-(aq) + H_3O+(aq)$

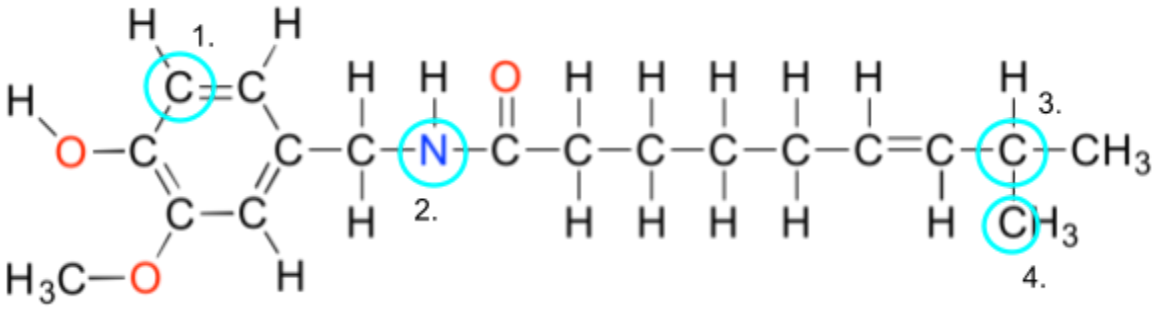
3. A $Zn^{2+}$ ion has a total spin of 0 and has no unpaired electrons. True or False: It is in the ground state.

**EASY PACKET 4** Team ID: _____

1. The actual gas pressure calculated inside of the container exceeds the pressure calculated by PV = nRT. What kind of forces dominate? Circle the correct answer.

Attractive Repulsive

2. The lewis structure of capsaicin is given below. Determine the hybridization of the circled atoms.




capsaicin

3. What is the molecular geometry of $BrF_5$?

# EASY PACKET 5

Team ID: _____

1. State the full electron configurations of the elements below
    a. $Al^{-2}$
    b. $As^{+3}$
    c. Ba

2. Considering the rusting of iron in air with the presence of water, identify the following:
    a. Oxidizing agent:
    b. Reducing agent:
    c. The product of oxidation half reaction:
    d. The product of reduction half reaction:

3. What is the oxidation number of oxygen in $H_2O_2$?

# EASY PACKET 6

Team ID: _____

1. Is $CaCO_3$ soluble in water?

2. What does STP stand for?

3. What is the formula for perchloric acid?

**EASY PACKET 7** Team ID: _____

1. Does atomic radius increase, decrease, or stay the same moving from left to right across the periodic table?

2. How many lone pairs does an atom with trigonal pyramidal geometry have?

3. Rank the following intermolecular forces from weakest to strongest: Dipole-dipole, London Dispersion, and Hydrogen Bonding?

# EASY PACKET 8

Team ID: _____

1. A mechanism for the reaction of nitric oxide with hydrogen to form water and nitrogen gas is proposed below. What rate law is predicted by this mechanism?

   $2\ NO(g) \rightleftarrows N_2O_2(g)$ fast, unfavorable equilibrium
   $N_2O_2(g) + H_2(g) \rightarrow N_2O(g) + H_2O(g)$ slow, irreversible
   $N_2O(g) + H_2(g) \rightarrow H_2O(g) + N_2(g)$ fast, irreversible

2. What are the units of k if the rate law of a reaction is rate = $k[X]^0[Y]^0$?

3. Name the molecular geometry of $NH_3$.

# EASY PACKET 9

Team ID: _____

1. How many valence electrons are present in $PCl_5$?

2. Knowing that $2SO_2(g) + O_2(g) \leftrightarrow 2SO_3(g)$, after A mol of $SO_2$ and B mol of $O_2$ finish reacting within a closed container with the volume of V L. What is the ratio between the number of sulfur atoms and the number of oxygen atoms in terms of A and B.

3. Rank the polarity question. Rank the polarity of the following molecules

   $H_2O$, $BF_3$, HF

   _____ < _____ < _____

   Least polar Most polar

# EASY PACKET 10 Team ID: _____

1. Given the coordination complex, what is the charge of the metal?
    a. $[Ag(NH_3)_2]^+$
    b. $[HgI_4]^{2-}$
    c. $[Ni(H_2O)_6]Cl_2$

2. Rank the bond angles of the following molecules in order from least to greatest:

    $H_2O$ $SF_6$ $CO_2$

3. What is the name of the compound $Fe_2O_3$?

# EASY PACKET 11 Team ID: _____

1. Balance the following reaction: $FeCl_3 + NaOH \rightarrow Fe(OH)_3 + NaCl$

2. Write out the chemical formula of hydrobromic acid.

3. A strongly acidic solution has a very _____ (small/large) pKa value.

**EASY PACKET 12** Team ID: _____

1. Rank the following elements in order of increasing electronegativity: Cl P F

2. How many valence electrons does sulfuric acid have?

3. Balance the following reaction: $CH_4 + O_2 \rightarrow CO_2 + H_2O$

# EASY PACKET 13

Team ID: _____

1. What is the molecular geometry of $CH_4$?

2. Rank the following elements in order of increasing atomic radius: Rb C O Ca

3. If the reaction quotient, Q, is less than the equilibrium constant, K, the reaction will proceed towards the _____ (reactants or products) to reach equilibrium.

**EASY PACKET 14** Team ID: _____

1. Write out the chemical formula of the following compound: Vanadium (IV) carbonate.

2. How many valence electrons are there in titanium?

3. Does Mg or Al have a higher 2nd ionization energy?

# EASY PACKET 15

Team ID: _____

1. What's the systematic name of $Cu(SO_4)$?

2. What's the systematic name of $H_2SO_4$?

3. What's the systematic name of $HNO_2$?

# EASY PACKET 16

Team ID: _____

1. What's the systematic name of $PCl_5$?

2. Write the chemical formula of phosphoric acid?

3. Write the chemical formula of nitric acid?

# EASY PACKET 17

Team ID: _____

1. Balance the following reaction:

   $P_4O_{10} + H_2O \rightarrow H_3PO_4$

2. Balance the following reaction:

   $CO_2 + H_2O \rightarrow C_6H_{12}O_6 + O_2$

3. Draw the lewis dot structure of $CH_2O$. Include all lone pairs as dots in the diagram

**EASY PACKET 18** Team ID: _____

1. What is the name of the type of resonance structure that can be drawn for molecules with SN5 and SN6 molecular geometries?

2. What is the molecular geometry of sulfur hexafluoride?

3. What kind of geometry is obtained when a central atom is attached to four lone pairs and two other atoms?

**EASY PACKET 19** Team ID: _____

1. Order the following bonds from least polar to most polar
   C-O, H-H, K-F

2. Order the following elements/ions from smallest to largest
   $Na^+$, $F^-$, Ne, $Mg^{2+}$, Cl, S

3. How many pi bonds are in HCN?

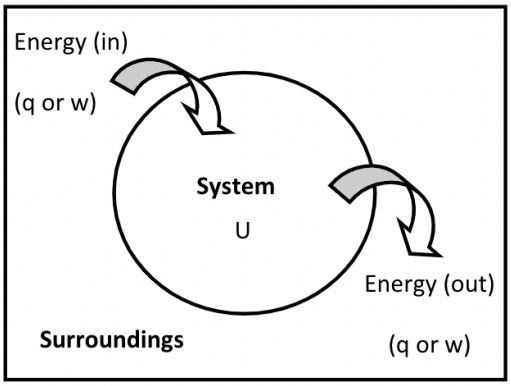
# EASY PACKET 20 Team ID: _____

1. Balance the following combustion reaction

   $C_3H_6O + O_2 \rightarrow CO_2 + H_2O$

2. Draw all equivalent resonance structures of $C_6H_6$

3. In any process, energy can be changed from one form to another, and energy can be transferred between a system and its surroundings. Suppose the circle in the diagram shown below represents a system in which matter is unable to flow in or out.




   Is this an isolated, closed, or open system?

**EASY PACKET 21** Team ID: _____

1. Which of the following molecules has a shorter N-O bond?
   $NO_2$, $NO_3^-$

2. Which of the following molecules has the greatest bond order in the S-O bond?
   $SO_2$, $SO_3^-$, $SO_4^{2-}$

3. Rank the following atoms from lowest to highest electron affinity
   N, O, P

**EASY PACKET 22** Team ID: _____

1. How many pi bonds are in benzene ($C_6H_6$)?

2. How many pi bonds are in $CO_2$?

3. How many sigma bonds are in ethene ($C_2H_4$)?