

EASY PACKET 1

ANSWER KEY

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: $2 CuSO_4 + 4 KI \rightarrow 2 CuI + I_2 + 2 K_2SO_4$

$CuSO_4$ is the oxidizing agent and KI is the reducing agent

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

$$49 \text{ g } CH_3OH \times (1 \text{ mol } CH_3OH / 32.04 \text{ g/mol}) = 1.53 \text{ mol } CH_3OH$$

EASY PACKET 2

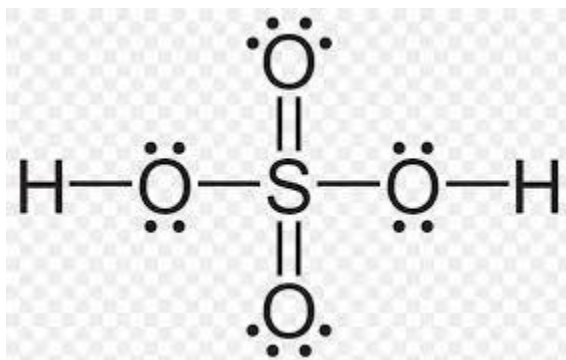
ANSWER KEY

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



2. Draw the lewis structure for H_2SO_4

Answer:



3. Rank the following atoms and ions in order of decreasing first ionization energy:



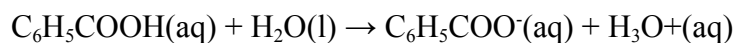
EASY PACKET 3

ANSWER KEY

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

Trigonal planar

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



Acid: $\text{C}_6\text{H}_5\text{COOH}(\text{aq})$ or $\text{H}_3\text{O}^+(\text{aq})$

Base: $\text{H}_2\text{O}(\text{l})$ or $\text{C}_6\text{H}_5\text{COO}^-(\text{aq})$

* $\text{C}_6\text{H}_5\text{COOH}(\text{aq})$ needs to be paired with $\text{C}_6\text{H}_5\text{COO}^-(\text{aq})$ and $\text{H}_2\text{O}(\text{l})$ needs to be paired with $\text{H}_3\text{O}^+(\text{aq})$

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.

True

EASY PACKET 4

ANSWER KEY

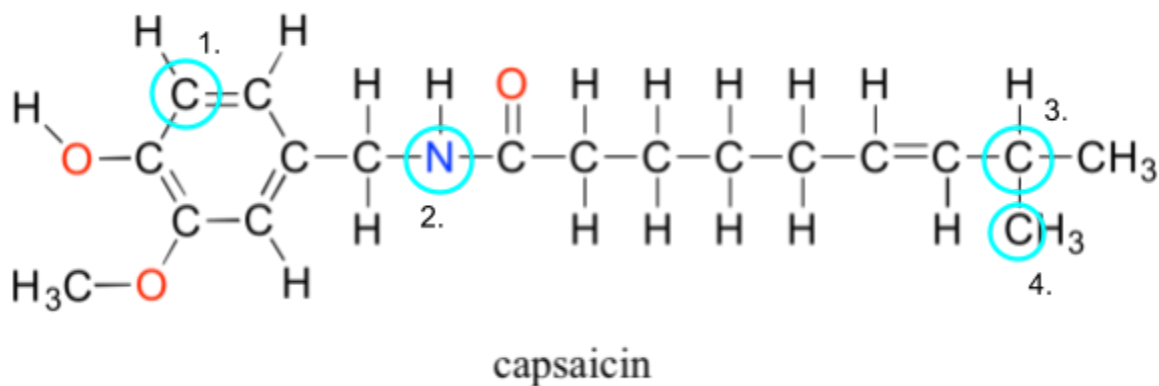
1. The actual gas pressure calculated inside of the container exceeds the pressure calculated by $PV=nRT$. What kind of forces dominate? Circle the correct answer.

Attractive

Repulsive

Repulsive

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



1- sp^2

2- sp^2

3- sp^3

4- sp^3

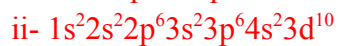
3. What is the molecular geometry of BrF_5 ?

Square pyramidal

EASY PACKET 5

ANSWER KEY

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: O_2
 - b. Reducing agent: Fe
 - c. The product of oxidation half reaction: Fe^{2+}
 - d. The product of reduction half reaction: OH^-

3. What is the Oxidation number of Oxygen in H_2O_2 ? (Answer: -1)

EASY PACKET 6

ANSWER KEY

1. Is CaCO_3 soluble in water? (Answer: No)
2. What does STP stand for? (Answer: Standard Temperature and Pressure)
3. What is the formula for perchloric acid? (Answer: HClO_4)

EASY PACKET 7

ANSWER KEY

1. Does atomic radius increase, decrease, or stay the same moving from left to right across the periodic table? (Answer: decrease)
2. How many lone pairs does an atom with trigonal pyramidal geometry have? (Answer: 1)
3. Rank the following intermolecular forces from weakest to strongest: Dipole-dipole, London Dispersion, and Hydrogen Bonding? (Answer: London Dispersion < Dipole-dipole < Hydrogen Bonding)

EASY PACKET 8

ANSWER KEY

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?

$2 \text{NO}(\text{g}) \rightleftharpoons \text{N}_2\text{O}_2(\text{g})$ fast, unfavorable equilibrium

$\text{N}_2\text{O}_2(\text{g}) + \text{H}_2(\text{g}) \rightarrow \text{N}_2\text{O}(\text{g}) + \text{H}_2\text{O}(\text{g})$ slow, irreversible

$\text{N}_2\text{O}(\text{g}) + \text{H}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{g}) + \text{N}_2(\text{g})$ fast, irreversible

$$\text{Rate} = k[\text{NO}]^2[\text{H}_2]$$

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

$$\text{M s}^{-1}$$

3. Name the molecular geometry of NH_3 .

Trigonal pyramidal

EASY PACKET 10

ANSWER KEY

1. Given the coordination complex, what is the charge of the metal?

- a. $[\text{Ag}(\text{NH}_3)_2]^+$
- b. $[\text{HgI}_4]^{2-}$
- c. $[\text{Ni}(\text{H}_2\text{O})_6]\text{Cl}_2$

- a. $[\text{Ag}(\text{NH}_3)_2]^+$ Ag: +1
- b. $[\text{HgI}_4]^{2-}$ Hg: +2
- c. $[\text{Ni}(\text{H}_2\text{O})_6]\text{Cl}_2$ Ni: +2

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



SF_6 (90, octahedral) < H_2O (<109, bent) < CO_2 (180, linear)

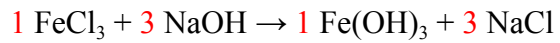
3. What is the name of the compound Fe_2O_3 ?

Iron (III) Oxide

EASY PACKET 11

ANSWER KEY

1. Balance the following reaction: $\text{FeCl}_3 + \text{NaOH} \rightarrow \text{Fe}(\text{OH})_3 + \text{NaCl}$



2. Write out the chemical formula of hydrobromic acid.



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

Small

EASY PACKET 12

ANSWER KEY

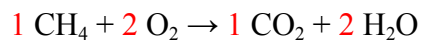
1. Rank the following elements in order of increasing electronegativity: Cl P F



2. How many valence electrons does sulfuric acid have?

32

3. Balance the following reaction: $\text{CH}_4 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$



EASY PACKET 13

ANSWER KEY

1. What is the molecular geometry of CH_4 ?
Tetrahedral

2. Rank the following elements in order of increasing atomic radius: Rb C O Ca
 $\text{O} < \text{C} < \text{Ca} < \text{Rb}$

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.
Products

EASY PACKET 14

ANSWER KEY

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



2. How many valence electrons are there in titanium? (4)

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

EASY PACKET 15

ANSWER KEY

1. What's the systematic name of $\text{Cu}(\text{SO}_4)$

Copper (II) sulfate

2. What's the systematic name of H_2SO_4 (Sulfuric acid)

3. What's the systematic name of HNO_2 (Nitrous acid)

EASY PACKET 16

ANSWER KEY

1. What's the systematic name of PCl_5 (Phosphorus pentachloride)

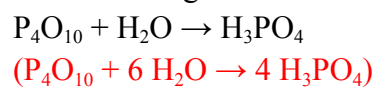
2. Write the chemical formula of phosphoric acid (H_3PO_4)

3. Write the chemical formula of nitric acid (HNO_3)

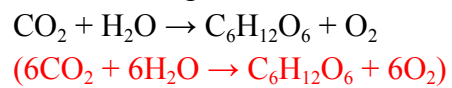
EASY PACKET 17

ANSWER KEY

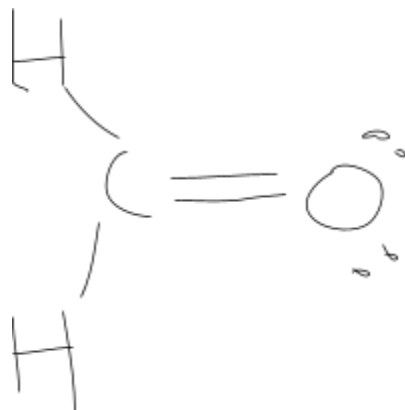
1. Balance the following reaction:



2. Balance the following reaction:



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



EASY PACKET 18

ANSWER KEY

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

Hyperconjugative resonance structures

2. What's the specific molecular geometry of sulfur hexafluoride? (octahedral)

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

Linear

EASY PACKET 19

ANSWER KEY

1. Order the following bonds from least polar to most polar

C-O, H-H, K-F

(H-H, C-O, K-F)

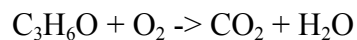
2. Order the following elements/ions from smallest to largest

Na⁺, F⁻, Ne, Mg²⁺, S, Cl

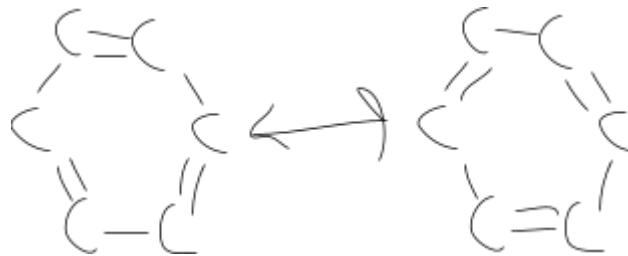
(Mg²⁺, Na⁺, Ne, F⁻, Cl, S)

3. How many pi bonds are in HCN? (2)

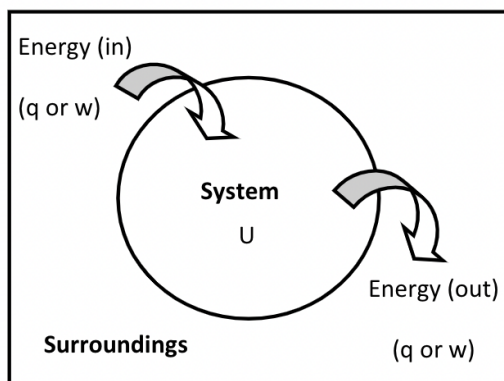
1. Balance the following combustion reaction



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? **Closed**

EASY PACKET 21

ANSWER KEY

1. Which of the following molecules has a shorter N-O bond?

NO_2 , NO_3^- (NO_2)

2. Which of the following molecules has the greatest bond order in the S-O bond?

SO_2 , SO_3^- , SO_4^{2-} (SO_4^{2-})

3. Rank the following atoms from lowest to highest electron affinity

N, O, P

(P, N, O)

EASY PACKET 22

ANSWER KEY

1. How many pi bonds are in benzene (C_6H_6)? (3)
2. How many pi bonds are in CO_2 ? (2)
3. How many sigma bonds are in ethene (C_2H_4)? (5)