

# CHEM 201 Laboratory of General Chemistry (2) Laboratory Reports

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Report No. (1):	
Percent Composition of Zinc and Copper in coin	S.

udent Names	8:	•••••		Section	n No:
ectives:					
ılts and ca	lculation:				
You will r	now create a excel t	able for of the meta	als might look li	ike this:	
objects	mass (g)	Volume before	Volume after	Volume object	d (g/mL)
	(8)	(mL)	(mL)	(mL)	(8//
				Average	
				% Error	
				% Precision	
Create a ta	able that correlates	the density of a Cu	/Zn composite (	coins) to the percent	Cu present.
					- · · · · · · · ·
	0 p %	Cu Density of	f Cu/Zn composit	te(g/mL)	
	10 20				
	50				
	70				
	100				
Plot a grap Cu presen		e density of a Cu/Z	Zn composite (co	oins) to the percent	
t does this to	ell you about the r	elative monetary v	value of Cu and	1 <b>7</b> n?	
, aucs mis l	in you about the I	CIALITE IIIVIICIAI Y	varue or en alle	. ZII.	

## Report No. (2): Atomic Emission spectra -Flame Tests Experiment

Student Names:				Section No:
Objectives:				
Colour of light   Approx. \( \lambda \)   Colour of light   Colour of light   Approx. \( \lambda \)   Colour of light   Colour of				
Results and calculation:				
	Red	700-620	Green	
	Orange	620-580	Blue	
	Yellow	580-560	Violet	
	Green	560-490	Red	
	Blue	490-430	Orange	
	Violet	430-380	Yellow	
Unknown number: () 1. Color of light transmitted:		1. Col	or of light transn	nitted:
2. Color of light absorbed:				
3. Metal atom:		3. Me	tal atom:	
4. Wavelength range:				
5. The energy of the wavelength	1:	5. The	e energy of the w	avelength:
		•••••		
		• • • • •	• • • • • • • • • • • • • • • • • • • •	
6. The energy of the wavelength		6. The	e energy of the w	avelength:
	• • • • • • • • • • • • • • • • • • • •			•••••

Report No. (3):
Measuring the pH of a Solution

Student Names:	Section No:
Objectives:	
Results and calculation:	
Part One: Using HCl Solution.	
Balance Equation:	

Vnaoh	РН
0	
5	
10	
15	
20	
22	
23	
24	
26	
27	
30	
35	
40	

- Draw a curve between pH values and the volume added from NaOH and then from the curve determine :
  - ✓ The volume of NaOH at equivalent point ......
  - ✓ pH value at equivalent point .....

•	Calculations: - Molarity of HCl
	- Normality
	- Molecular weight of HCl
	- Strength of solution.

#### Part two: Using CH<sub>3</sub>COOH Solution.

Balance Equation:

V <sub>NAOH</sub>	PH
0	
5	
10	
20	
25	
28	
29	
30	
31	
32	
35	
40	
45	

- Draw a curve between pH values and the volume added from NaOH and then from the curve determine:
  - ✓ The volume of NaOH at equivalent point ......
  - ✓ pH value at equivalent point .....

•	Calculations:
	- Molarity of CH <sub>3</sub> COOH
	- Normality
	- Molecular weight of CH <sub>3</sub> COOH
	- Strength of solution.

Report No.	<b>(4):</b>
Molecular Str	ucture

Student Names: Section No:
Objectives:
Here are selections of suggested molecules and molecular ions for which their three-dimensional structures
(geometric shapes) and approximate bond angles are to be determined. Consider VSEPR formulas and their
related geometrical shapes as represented in Table 1, while completing the following tables.

### A) Complete the following table for many molecules and ions, all of them obey the Lewis octet rule.

Molecular or Ions	Lewis structure	Valence shell e pairs	Bonding electron pairs	Nonbonding electron pairs	VSEPR formula	3-D structure	Approx. bond angle	Geometric shape
CH <sub>4</sub>								
NH <sub>3</sub>								
NH <sub>4</sub> <sup>+</sup>								
PF <sub>3</sub>								
PF <sub>4</sub>								
H <sub>2</sub> O								
PO <sub>4</sub> -3								

# B) Complete the following table (as the previous one) for many molecules and ions, none of them obey the Lewis octet rule.

Molecular or Ions	Lewis structure	Valence shell e pairs	Bonding electron pairs	Nonbonding electron pairs	VSEPR formula	3-D structure	Approx. bond angle	Geometric shape
SF <sub>6</sub>								
XeF <sub>4</sub>								
PCl <sub>2</sub> F <sub>3</sub>								
BF <sub>3</sub>								

C) Draw the following molecules using MOLVIEW website ( <a href="https://molview.org/">https://molview.org/</a> ) and investigate their shapes and properties like bond angle, bond length and compare the results by which you are expected above.  a. CH <sub>4</sub>
b. $H_2O$
$c.NH_3$
d. SF <sub>6</sub>
$e.SO_3$
f. SO3 <sup>-2</sup>
D) Arrange the molecules (a ,b, c) in the increasing order of bond angle and discuss the reason behind
this order.

#### **Report No. (5):**

## Chemical equilibrium – (part 1) Ionic equilibrium in solution.

	Tome equinorium in solution.	
Student Names:	Section No:	
Objectives:		
<b>Balance Equation:</b>		
Results and calculation:		
Part A: Concentration Changes		

**Table (1):** Equilibrium shift on increasing the concentration:

Boiling tube	Substance added at equilibrium	Change in the color intensity as matched with the reference solution in boiling tube "a"	Effect on the concentration of [Fe(SCN)(H <sub>2</sub> O) <sub>5</sub> ] <sup>2+</sup>	Direction of shift in equilibrium
A	5 ml of water			
В	5 ml of 0.1M FeCl <sub>3</sub> solution			
C	5 ml of 0.1M KSCN solution			
D	5 ml of 0.1M KCl solution			

#### Part B: Changes in Temperature

Table (2): The effect of temperature changes (hot and cold) on the aqueous equilibrium after placing the test tubes in hot water and ice water

Boiling tubes	Water temperature	Change in the color intensity as matched with the reference solution in boiling tube "a"	Direction of shift in equilibrium
1			
2			
3			

What is Le Chatelier's principle?
What are the factors affecting the Position of Equilibrium?

# $\begin{tabular}{ll} Report \ No. \ (6): \\ Chemical \ equilibrium - (part \ 2) \\ Determination \ of \ the \ equilibrium \ constant \ for \ formation \ of \ important \ ethyl \ ethanoate \\ \end{tabular}$

			Section No:
Objectives:			
Salance Equation:			
esults and calcula	ation:		
V initial (ml	l) V <sub>final</sub> (m)	l) V (ml)	V Average (ml)
		<u> </u>	
•••••		•••••	
et the [CH <sub>2</sub> COOH] at	equilibrium that is deter	mined from the titration	be x M.
et the [CH3COOH] at	equilibrium that is deter	mined from the titration	be x M.
et the [CH <sub>3</sub> COOH] at	equilibrium that is deter	mined from the titration  CH <sub>3</sub> COOH (aq)	be x M.  CH <sub>3</sub> COOCH <sub>2</sub> CH <sub>3</sub> (aq) + H <sub>2</sub> O (1)
Initial conc. (M)			
Initial conc. (M)  At equilibrium(M)	CH <sub>3</sub> CH <sub>2</sub> OH (aq)	CH <sub>3</sub> COOH (aq)	
Initial conc. (M)  At equilibrium(M)	CH <sub>3</sub> CH <sub>2</sub> OH (aq)	CH <sub>3</sub> COOH (aq)	CH <sub>3</sub> COOCH <sub>2</sub> CH <sub>3</sub> (aq) + H <sub>2</sub> O (1)

#### Report No. (7): Kinetic study of Sodium Thiosulfate reaction with Hydrochloric Acid

Student Names:	Section No:
Objectives:	
Balance Equation:	

#### **Results and calculation:**

The first case is when the chloric acid concentration is constant and the sodium thiosulfate concentration changes

No.of exp	V(Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> )	V(H <sub>2</sub> O)	V(HCl)	V	$V^2$	T (sec)	1/t
1	25	0	4				
2	20	5	4				
3	15	10	4				
4	10	15	4				
5	5	20	4				

- Plot the relationship between V and (1 / t) with k' illustrated.
- The law is.....

The second case: when the chlorine acid concentration changes and the sodium thiosulfate concentration remains constant

No.of exp	V(Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> )	V(H <sub>2</sub> O)	V(HCl)	V	$V^2$	T (sec)	1/t
1	10	0	5				
2	10	1	4				
3	10	2	3				
4	10	3	2				
5	10	4	1				

- Plot the relationship between V and (1/t).
- The law is.....

Oxidatio	Report No. (8): on-reduction reactions (Redox	reactions).
Student Names:		Section No:
bjectives:		
esults and calculation:		
art one: Potential Series for metals 1. Reactions of Hydrogen with C	Copper, and Zinc	
Colors of Halogen	Observations	Net ionic equation
Copper + hydrochloric acid		
Zinc + hydrochloric acid		
2. Reactions of Copper, silver, a  Colors of Halogen  Copper + zinc sulfate	Observations	Net ionic equation
Zinc + copper sulfate		
1: Relative oxidizing strengths, whic	h is the stronger oxidizing agen	nt Cu <sup>2+</sup> or Zn <sup>2+</sup> ?
Colors of Halogen	Observations	Net ionic equation
Copper + silver nitrate		
2: Arrange Cu <sup>2+</sup> , Zn <sup>2+</sup> , Ag <sup>+</sup> , and H <sup>+</sup>		

#### Part two: Potential Series for Halogens

part	Colors of Halogen	Color in Cyclohexane	Observations	Net ionic equation
а				
b				
c				
d				

What is the correct order of oxidizing strength of (Cl2, I2)?
You don't test $(F_2)$ in this experiment, but according to the order you observed for the other halogens, expect the oxidizing strength of $F_2$ and explain your answer?