

**UNIT 5A – CHEMICAL REACTIONS I (ACIDS AND BASES)**

**WASHINGTON LATIN PUBLIC CHARTER SCHOOL  
CHEMISTRY 2019-20**

**UNIT 5A – CHEMICAL REACTIONS I – ACIDS AND BASES  
PRACTICE TEST**

Answer all questions  
Recommended time = 50 minutes  
BAHATI NJEMA!

Name:	
Score for Q1 - 3 (open response)	/24
Score for Q4 - 10 (multiple choice)	/7
Bonus (Submits quiz on time and in correct format)	/9

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**SECTION A – OPEN RESPONSE**

<b>1.</b>	Neutralization reactions are reactions between acids and bases to produce salts. They have a variety of uses, including making different salts.			
	Complete the following table to show the names and formulas of different acids, bases and salts:			
	Name	formula	acid, base or salt?	
		CaO	Base	
		HCl		
	calcium chloride			
	copper sulfate			
		H <sub>2</sub> SO <sub>4</sub>		
		CuCO <sub>3</sub>		
				5
	(a)	Complete the following symbol equations for neutralization reactions:		
		(i)	CaO + 2HCl →	
		(ii)	CuCO <sub>3</sub> + H <sub>2</sub> SO <sub>4</sub> →	4
	(b)	State a useful application of reaction (a) (i)		
				1
(c)	You carried out a very similar reaction to (a) (ii) in the lab. After mixing the acid and the base together, what two steps did you take to get pure solid sample of the salt?			
	Step 1			
	Step 2			
			2	
<b>TOTAL</b>			<b>12</b>	

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**2.** The acidity or alkalinity of a solution can be captured in a simple number called the pH.

The acidity or alkalinity of a solution can also be determined by using acid-base indicators. Two common indicators are methyl orange and phenolphthalein. The colors and end-point pH ranges of these indicators are shown in the table below:

Indicator	Color 1	End-point pH range	Color 2
methyl orange	pink	2.9 – 4.6	yellow
phenolphthalein	colorless	8.3 – 10.0	purple

A sample of rainwater was analysed and found to have a pH of 5.

A sample of bathroom cleaner was analysed and found to have a pH of 13.

A sample of pure water was also analysed.

Complete the following table:

Sample	pH	acid, neutral or alkaline?	Color it turns methyl orange	Color it turns phenolphthalein
Bathroom cleaner	5			
Rainwater	13			
Pure water				

TOTAL 5

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<b>3.</b>	<p>Nitric acid, <math>\text{HNO}_3</math>, is a strong acid. Nitrous acid, <math>\text{HNO}_2</math>, is a weak acid.</p> <p>Both acids are neutralized by calcium oxide according to the following equations:</p> <p>Nitric acid: <math>2\text{HNO}_3 + \text{CaO} \rightarrow \text{Ca}(\text{NO}_3)_2 + \text{H}_2\text{O}</math></p> <p>Nitrous acid: <math>2\text{HNO}_2 + \text{CaO} \rightarrow \text{Ca}(\text{NO}_2)_2 + \text{H}_2\text{O}</math></p>		
	(a)	What is the difference between a strong acid and a weak acid?	
			2
	(b)	Write ionic equations to show what happens to nitric acid and nitrous acid in water: (you might need this symbol $\rightleftharpoons$ )	
	(i)	nitric acid	
	(ii)	nitrous acid	
			3
	(c)	<p>Marcus poured 50 mL of 1 mol/L nitric acid into a boiling tube. He then added <math>\text{CaCO}_3</math> powder gradually to the boiling tube until the acid had been completely neutralized.</p> <p>He then repeated the experiment with 50 mL of 1 mol/L nitrous acid.</p>	
	(ii)	State one similarity Marcus would observe when repeating the experiment using the nitrous acid solution.	
	(iii)	State one difference Marcus would observe when repeating the experiment using the nitrous acid solution.	
			2
<b>TOTAL</b>			<b>7</b>

## SECTION B – MULTIPLE CHOICE

Do not answer these questions on this document. Click on the answer sheet provided at the end of the questions.

<b>4.</b>	When iron carbonate reacts with nitric acid, the name of the salt produced is	
	A	carbonic acid
	B	sodium chloride
	C	nitric carbonate
	D	iron nitrate
<b>1</b>		

<b>5.</b>	A solution of washing soda has a pH of 9. It could be described as:	
	A	strongly acidic
	B	weakly acidic
	C	neutral
	D	weakly alkaline
	E	strongly alkaline
<b>1</b>		

<b>6.</b>	Which of the following solutions has the lowest pH?	
	A	1 mol/L sodium hydroxide
	B	Vinegar
	C	pure water
	D	1 mol/L hydrochloric acid
	E	orange juice
<b>1</b>		

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**Questions 7 – 9**

25 mL of a standard solution of sodium carbonate (0.5 mol/L) was placed in a conical flask. Two drops of methyl orange indicator were added and a solution of sulfuric acid (of unknown concentration) was gradually added from a burette. When 18.3 mL of the sulfuric acid had been added, the indicator changed color.

<b>7.</b>	The formula of the salt produced in this reaction is:	
	A	Na <sub>2</sub> CO <sub>3</sub>
	B	Na <sub>2</sub> SO <sub>4</sub>
	C	H <sub>2</sub> SO <sub>4</sub>
	D	Na <sub>2</sub> CO <sub>3</sub>
	E	K <sub>2</sub> SO <sub>4</sub>
<b>1</b>		

<b>8.</b>	(Use the table in question 2 to help you with this question) At the equivalence point of this titration, the indicator will change from	
	A	orange to yellow
	B	pink to yellow
	C	yellow to orange
	D	yellow to pink
	E	orange to pink
<b>1</b>		

<b>9.</b>	Use the formula $C_2 = \frac{C_1 V_1}{V_2}$ to answer this question. The molarity of the sulfuric acid used in this titration is	
	A	0.34 mol/L
	B	0.37 mol/L
	C	0.68 mol/L
	D	1.37 mol/L
	E	3.4 mol/L
<b>2</b>		

[Go to the answer sheet](#)