WASHINGTON LATIN PUBLIC CHARTER SCHOOL
CHEMISTRY 2019-20

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

SECTION A – OPEN RESPONSE

1.	Neutralization reactions are reactions between acids and bases to produce salts. They have a variety of uses, including making different salts.				
	(a)	Write balanced symbol equations for the following neutralization reactions and name the salt produced:			
		(i)	Reactants:	magnesium carbonate and nitric acid	
			Symbol equation:	CO_2 is produced	
			Name of salt:	No clue needed here	
		(ii)	Reactants:	ammonia and sulfuric acid	6
			Symbol equation:	$2NH_3$ in equation	
			Name of salt:	No clue needed here	
	(b)	State what you would observe as reaction (a) (i) was taking place			
		$MgCO_3$ is a solid. What will happen to it? CO is produced. What will you see?			2
	(c)	When preparing a pure sample of the salt from reaction (a) (i), one of the reactants should be added in excess. Which reactant is this, and why should it be added in excess?			

		Which of the reactants is insoluble? How can you remove this reactant? Why is this useful?	3
		TOTAL	11

2.	The pH scale is a logarithmic scale designed to capture the acidity or alkalinity of a solution in a simple number.			
	(a)	Solution A has a hydrogen ion (H^+) concentration of 1×10^{-4} mol/L. What is the pH of solution A?		
		easy		1
	(b)	Solution B has a hydroxide ion (OH^-) concentration of 1×10^{-3} mol/L. What is the pH of solution B?		
		If you got 1 out of 2, you didn't show any working		2
	(c)	Solution C is pure water. What is the hydrogen ion (H^+) concentration in pure water?		
		Easy, but give the H^+ concentration, not the pH		1
	(d)	Bromothymol blue is an indicator with an end-point pH range of 6.0 - 7.7. It's color 1 is yellow and it's color 2 is blue Deduce the color of bromothymol blue in		
		Solution A	Use end-point pH range above	
		Solution B	Use end-point pH range above	3
		Solution C	It's inside the end-point pH range – mixture of the colors?	
	TOTAL			7

3.	Lactic acid, $HC_3H_5O_3$, is a weak acid. Casey had a solution of lactic acid of unknown molarity. She determined the molarity of the lactic acid solution by carrying out a titration with 0.10 mol/L sodium hydroxide solution. She found that 21.5 mL of the lactic acid solution were required to react with 25 mL of the sodium hydroxide solution.		
	(a)	Write an equation to show what happens to lactic acid when it is mixed with water.	2
		$HC_3H_5O_3$ don't add water, just show it breaking up into H^+ ions and another ion and use a reversible sign	
	(b)	Write an equation to show the reaction between lactic acid and sodium hydroxide.	1
		Swap the H with Na	
	(c)	Describe in detail how Casey would perform the titration. Include the names of any equipment used.	4
		You must mention burette, conical flask and pipette	
	(d)	Calculate the molarity of the lactic acid solution. Show your working.	3
		Step 1 – find moles of NaOH (volume in litres x molarity) Step 2 – find moles of lactic acid (it's a 1:1 ratio) Step 3 – find molarity of lactic acid (noles of lactic acid / volume in litres)	
	TOTAL		10

SECTION B – MULTIPLE CHOICE

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

4.	The formula of aluminium sulfate is (Al^{3+}, SO_4^{2-})	
	A	Al_3S_2
	B	$Al(SO_4)_2$
	C	Al_2SO_4
	D	$Al_2(SO_4)_3$
	E	$Al_3(SO_4)_2$
		1

5.	It is not possible to produce a pure sample of aluminium sulfate by adding	
	A	aluminium hydroxide to sulfuric acid
	B	aluminium oxide to sulfuric acid
	C	aluminium chloride to sulfuric acid
	D	aluminium carbonate to sulfuric acid
Which reactant is not an insoluble base? 1		

6.	Lactic acid is a weak acid. In an aqueous solution of lactic acid, approximately 10% of lactic acid molecules react with water to form H^+ ions. The pH of 0.01 mol/L lactic acid is approximately 10% of 0.01 =	
	A	1
	B	2
	C	3
	D	4
	E	7
		2

7.	Which of the following solutions has the highest pH?	
	A	0.001 mol/L H_2SO_4 $H_2SO_4 \rightarrow 2H^+ + SO_4^{2-}$
	B	0.001 mol/L HCl $HCl \rightarrow H^+ + Cl^-$
	C	a solution containing 1×10^{-12} mol/L OH^- ions
	D	a solution containing 1×10^{-2} mol/L H^+ ions
	E	1 mol/L lactic acid
		Due to the equations in red above, sulfuric acid contains more H ions than hydrochloric acid of the same molarity 2

8.	What would happen if MgO powder was added separately to 50 mL of 0.5 mol/L HCl and 0.5 mol/L lactic acid? Look at the answer key to practice quiz Q3!	
	A	The lactic acid would dissolve more MgO but more slowly
	B	The lactic acid would dissolve less MgO and more slowly
	C	The lactic acid would dissolve the same amount of MgO but more slowly
	D	The lactic acid would dissolve the same amount of MgO and at the same rate.
	E	The lactic acid would dissolve more MgO and more quickly.
		1

Click here for answer sheet