

## **UNIT 5B: CHEMICAL REACTIONS II - REDOX REACTIONS**

**WASHINGTON LATIN PUBLIC CHARTER SCHOOL**

**CHEMISTRY 2019-20**

### **UNIT 5B TEST - CHEMICAL REACTIONS II: REDOX REACTIONS**

Answer all questions

Recommended time = 30 minutes

You must have a Periodic Table and a copy of the reactivity series.

حظا طيبا وفقك الله

Name:	
Score (open response)	/20
Score (multiple choice)	/5
Bonus (Submits quiz on time and in correct format)	/25
Total:	/50

## UNIT 5B: CHEMICAL REACTIONS II - REDOX REACTIONS

### SECTION 1 - OPEN RESPONSE

Fill in all green cells

1.	The elements in Group 2 are known as the “alkali earth metals”. Calcium and magnesium are very abundant but the others are not.  Nina dropped a small piece of magnesium metal into a beaker of hydrochloric acid (HCl). She then dropped a small piece of calcium metal into another beaker of hydrochloric acid.	
(a)	Explain what she would <b>observe</b> when she dropped the magnesium into the acid.	2
	<b>What will happen to the magnesium?</b> Hydrogen gas is produced – what will you see?	
(b)	Write an equation for the reaction taking place.	2
	<b>You get magnesium chloride and hydrogen – what is the equation?</b>	
(c)	Identify the atom oxidised and the atom reduced in this reaction.	2
	<b>Atom oxidised:</b> the atom which starts with a charge of zero and ends up positive <b>Atom reduced:</b> the atom which starts positive and ends up with a charge of zero	
(d)	Will the reaction between calcium and hydrochloric acid be faster or slower than the reaction between magnesium and hydrochloric acid? Explain your answer.	3
	<b>Which is lower in the Periodic Table?</b> <b>How does reactivity of metals change as you go down the Periodic Table?</b>	
	TOTAL	9

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2.	<p>Sophia set up a galvanic cell. On one side she immersed an iron (Fe) electrode into a solution of iron chloride (<math>\text{FeCl}_2</math>). On the other side she immersed a zinc (Zn) electrode into a solution of zinc chloride (<math>\text{ZnCl}_2</math>). She connects the electrodes with a wire and a light bulb. She connects the solutions with a salt bridge. When she does this the light comes on, but after a while she notices that the light gradually becomes dimmer.</p>		
(a)	Write an equation for the overall cell reaction taking place in this cell		
	$\text{FeCl}_2 + \text{Zn} \rightarrow ?$		2
(b)	Identify the positive electrode and the negative electrode.		
	positive electrode:	the reduction electrode – which metal is this?	
	negative electrode:	the oxidation electrode – which metal is this?	
(c)	Explain why the bulb lights up.		
	<b>What is electricity?</b> <b>How does this cell create electricity?</b>		2
(d)	As the light starts to dim, Sophia notices that the electrodes look a bit different to how they originally did. State one change she would observe in the appearance of the electrodes. Explain your answer.		
	<b>Which electrode is gaining metal atoms? What will you see when this happens?</b> <b>Which electrode is losing metal atoms? What will you see when this happens?</b>		2
TOTAL			8

## UNIT 5B: CHEMICAL REACTIONS II - REDOX REACTIONS

3.	Chris decided to electrolyse an aqueous solution of copper sulfate.		
	(a)	Name the element produced at the cathode during this electrolysis.	
		Cations go to the cathode. The cations are Cu <sup>2+</sup> and H <sup>+</sup> . Which will get reduced?	
	(b)	Name the element produced at the anode during this electrolysis.	
		Anions go to the anode. The anions are SO <sub>4</sub> <sup>2-</sup> and OH <sup>-</sup> . Which will get oxidized?	
	(c)	Which of the above elements is produced as a result of reduction?	
	Reduction happens at the cathode		
TOTAL			3

## SECTION 2 - MULTIPLE CHOICE

**Do not answer these questions on this sheet**

**Make a note of your answers and enter them in the answer sheet.**

4.	Which of the following will not happen when a piece of copper metal is dropped into a solution of silver nitrate? This is the reaction: 2AgNO <sub>3</sub> + Cu → Cu(NO <sub>3</sub> ) <sub>2</sub> + 2Ag	
	A	A grey solid will appear.
	B	The silver will be oxidized.
	C	The copper will gradually dissolve and turn the solution blue.
	D	The concentration of silver ions in the solution will decrease.
		1

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5.	Which of the following is not true of electrolytic cells? <b>Look at the final chart in the study guide. Two of these statements are true of all cells, one statement is only true of galvanic cells and one statement is only true of electrolytic cells.</b>	
	A	Oxidation takes place at the anode.
	B	Reduction takes place at the cathode.
	C	The anode is the positive electrode.
	D	Chemical energy is converted into electrical energy.
		1

6.	Which of the following statements about lithium-ion batteries is untrue? <b>Think about the battery in your phone</b>	
	A	They are low-density, compact and easily portable.
	B	They are cheap.
	C	They can be easily recharged.
	D	They are used in almost all cellphones.
		1

7.	Which of the following statements about the electrolysis of molten aluminium oxide is untrue? <b>Cation = <math>\text{Al}^{3+}</math>, Anion = <math>\text{O}^{2-}</math>; cations go to cathode, anions go to anode. Al is a reactive metal so you cannot make it by heating aluminium oxide with carbon</b>	
	A	Aluminium will form at the cathode.
	B	The process uses a lot of energy.
	C	Oxygen will form at the anode.
	D	There are cheaper ways to make aluminium.
		1

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<b>8.</b>	What will be the electrode products when a concentrated aqueous solution of sodium chloride (brine) is electrolysed?  Cathode: $\text{Na}^+$ or $\text{H}^+$ ? If the metal is above hydrogen in the reactivity series, you get hydrogen at the cathode, otherwise you get the metal Anode: $\text{OH}^-$ or $\text{Cl}^-$ ? It depends on concentration; high concentration – chlorine; low concentration – oxygen
<b>A</b>	Sodium at the cathode, chlorine at the anode.
<b>B</b>	Sodium at the cathode, oxygen at the anode.
<b>C</b>	Hydrogen at the cathode, chlorine at the anode.
<b>D</b>	Hydrogen at the cathode, oxygen at the anode.
1	

**End of Test**

[click here to go straight to the answer sheet and exit ticket](#)