Name:		Date:	
Chemistry ~ Ms. Hart	<u>Class:</u>	Anions or Cations	SCHOOL FOR CRIMINAL JUSTICE

11.2 Redox Reactions

SPARK:

1. What is the oxidation state for oxygen? Explain, in terms of electrons, the reason why oxygen has that particular oxidation state.

2. What is the oxidation state of nitrogen in $Ba(NO_3)_2$?

Oxidation States:

- Positive, negative, or neutral (0) values can be assigned to atoms.
 - These numbers are known as _____.
- Oxidation states identify how many electrons are either gained or lost by an atom or ion.

Quick Review and Practice

	Oxidation State	Atom or ion?	# of electrons
K ⁺¹			
Kr			
0-2			

Up until now, we have figured out the oxidation state by looking at the reference table. However, some elements have multiple oxidation states depending on the compound.

Example: Find the oxidation state of the elements in K₂Cr₂O₇.

*First ask yourself: Is this a compound or a polyatomic ion? WHY?

 \rightarrow This is a compound, so the total sum of the oxidation states must equal 0.

Element		
Subscript (how many are there?)		Total
Oxidation State		
Sum of oxidation states		

What is REDOX?



Action	LEO	the lion goes	GER
What does it mean?			
More positive or more negative?			
Example			

How do you identify a redox reaction?

- 1. Assign oxidation numbers to each atom
- 2. If both reduction and oxidation occurs, it is a redox reaction.

What?! Okay, here is an example.

Example 1:

$\mathbf{2} \operatorname{FeCl}_2 + \operatorname{Cl}_2 \xrightarrow{} \mathbf{2} \operatorname{FeCl}_3$

Step 1: Determine the oxidation state of each element on the product and reactant side.

Product Side		Reactant Side	
Element	Oxidation State	Element	Oxidation State

Step 2: Ask the following questions-

- 1. Did any of the oxidation states change from the reactant side to the product side?
- 2. Which element was reduced?
- 3. Which element was oxidized? _____
- 4. So, is this a REDOX reaction? _____

Helpful hints:

• If there is a free element on one side, but it is combined in a compound on another side it IS a redox reaction.

Example: $Zn + 2HCl \rightarrow ZnCl_2$

• If it is a double replacement reaction, it is NOT a redox reaction.

Example: $Zn(OH)_2 + 2 HCl \rightarrow ZnCl_2 + 2H_2O$

Try this:

Is this a redox reaction? Why or why not?

$2 \text{ Mg} + \text{O}_2 \rightarrow 2 \text{MgO}$

Step 1: Determine the oxidation state of each element on the product and reactant side.

Product Side		Reactant Side	
Element	Oxidation State	Element	Oxidation State

Step 2: Ask the following questions-

- 1. Did any of the oxidation states change from the reactant side to the product side?
- 2. Which element was reduced? _____
- 3. Which element was oxidized? _____
- 4. So, is this a REDOX reaction? ______

Classwork

Directions: determine whether or not the following reactions are REDOX reactions.

1. Zn + 2HCl \rightarrow ZnCl₂

2. 2HCl + FeS → FeCl₂

3. Cu + $2Ag^+ \rightarrow Cu^{2+} + 2Ag$

4. $Zn(OH)_2 + 2HCl \rightarrow ZnCl_2 + 2H_2O$

5. $4\text{HCl} + \text{MnO}_2 \rightarrow \text{MnCl}_2 + 2\text{H}_2\text{O} + \text{Cl}_2$

6. Zn + Cu²⁺ \rightarrow Zn²⁺ + Cu

7. $MnO_2 + 4H^+ + 2Fe^{2+} \rightarrow Mn^{2+} + 2Fe^{3+} + 2H_2O$

8. All redox reactions involve

(1) the gain of electrons only

(3) both the gain and the loss of electrons

(2) the loss of electrons only

(4) neither the gain nor the loss of electrons

9. A redox reaction is a reaction in which

- (1) only reduction occurs
- (2) only oxidation occurs
- (3) reduction and oxidation occur at the same time
- (4) reduction occurs first and then oxidation occurs

MORE PRACTICE:

BLAST FROM THE PAST

The table below shows mass and volume data for four samples of substances at 298 K and 1 atmosphere.

Masses and Volumes of Four Samples

Sa	mple	Mass (g)	Volume (mL)
	А	30.	60.
	В	40.	50.
	С	45	90.
	D	90.	120.

Which two samples could consist of the same substance?

(1) <i>A</i> and <i>B</i>	(3) B and C
(2) A and C	(4) C and D

Which electron configuration could represent a strontium atom in an excited state?

.

Which group on the Periodic Table of the Elements contains elements that react with oxygen to form compounds with the general formula X_2 O?

(1) Group 1	(3) Group 14
(2) Group 2	(4) Group 18

An unsaturated solution is formed when 80. grams of a salt is dissolved in 100. grams of water at 40.°C. This salt could be

(1)	KCl	(3)	NaCl
(2)	KNO ₃	(4)	NaNO ₃

- 37 Compared to an electron in the first electron shell of an atom, an electron in the third shell of the same atom has
 - (1) less mass (3) more mass
 - (2) less energy (4) more energy