

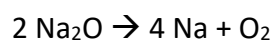
# Chemistry 1

## Volume 4

### Worksheet 3

#### Writing Half-Reactions for Redox – Part 2

1. Answer the questions that follow the reaction below.

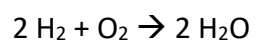


a. Write the net ionic equation.

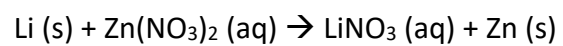
b. Write and balance the reduction and oxidation half-reactions.

c. Identify the oxidizing and reducing agents.

2. Break apart the following reaction into its half-reactions and balance them.



3. Answer the questions that follow the reaction below.



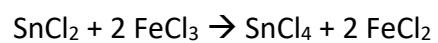
a. Balance the reaction.

b. Write the net ionic equation.

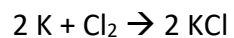
c. Write the redox half-reactions and balance them.

d. Identify the oxidizing and reducing agents.

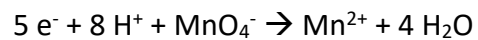
4. Break the following reaction into its oxidation and reduction half-reactions and balance them.



5. Break the following reaction into its oxidation and reduction half-reactions and identify the oxidizing and reducing agent.

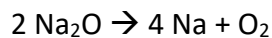


6. Balance and combine the following half-reactions.

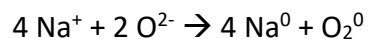


## Answer Key

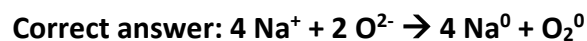
1. Answer the questions that follow the reaction below.



- a. Write the net ionic equation.



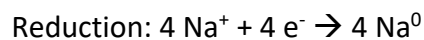
Nothing cancels, so this is the net ionic equation.



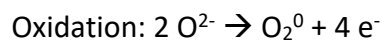
- b. Write and balance the reduction and oxidation half-reactions.

*Step 1:*

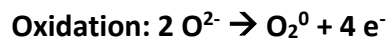
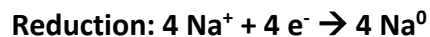
Na has gone from  $\text{Na}^+$  to  $\text{Na}^0$ , so it has become less positive by gaining an electron. It has been reduced.



O has gone from  $\text{O}^{2-}$  to  $\text{O}_2^0$  and has become more positive by losing two electrons. It has been oxidized.



**Correct answer:**





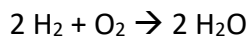
c. Identify the oxidizing and reducing agents.

Since  $\text{Na}^+$  has been reduced, it is the oxidizing agent.

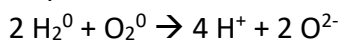
Since  $\text{O}^{2-}$  has been oxidized, it is the reducing agent.

**Correct answer: Oxidizing agent:  $\text{Na}^+$ ; Reducing agent:  $\text{O}^{2-}$**

2. Break apart the following reaction into its half-reactions and balance them.



*Step 1:*

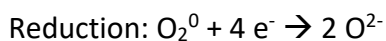
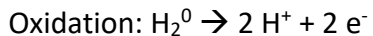


*Step 2:*

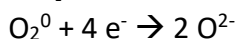
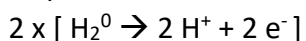
H has gone from  $\text{H}_2^0$  to  $\text{H}^+$

O has gone from  $\text{O}_2^0$  to  $\text{O}^{2-}$

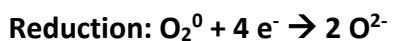
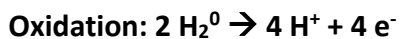
*Step 3:*



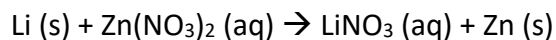
*Step 4:*



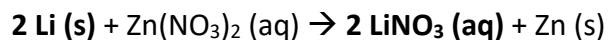
**Correct answer:**



3. Answer the questions that follow the reaction below.



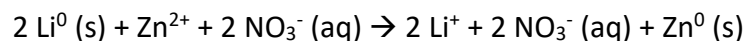
a. Balance the reaction.



b. Write the net ionic equation.

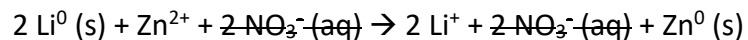
*Step 1:*

Break apart ionic compounds into their ions and assign oxidation numbers.

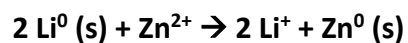


*Step 2:*

Find the net ionic equation by cancelling out common ions.



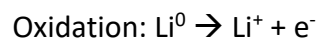
**Correct answer:**



c. Write the redox half-reactions and balance them.

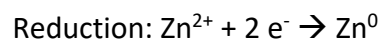
*Step 1:*

Li goes from  $\text{Li}^0$  to  $\text{Li}^+$ . Since it has become more positive, it has lost one electron and been oxidized.



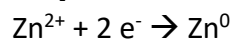
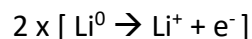
*Step 2:*

Zn goes from  $\text{Zn}^{2+}$  to  $\text{Zn}^0$ . It has become less positive and gained two electrons. This means it has been reduced.

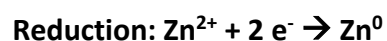


*Step 3:*

The electrons lost need to equal the electrons gained.



**Correct answer**



d. Identify the oxidizing and reducing agents.

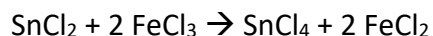
Since  $\text{Li}^0$  was oxidized, it is the reducing agent.

Since  $\text{Zn}^{2+}$  was reduced, it is the oxidizing agent.

**Reducing agent:  $\text{Li}^0$**

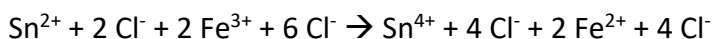
**Oxidizing agent:  $\text{Zn}^{2+}$**

4. Break the following reaction into its oxidation and reduction half-reactions and balance them.



*Step 1:*

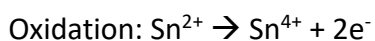
Write the total ionic equation.



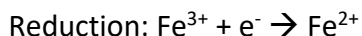
*Step 2:*

Identify the oxidation and reduction half-reactions.

Sn went from  $\text{Sn}^{2+}$  to  $\text{Sn}^{4+}$ . It became more positive by losing two electrons, so it has been oxidized.

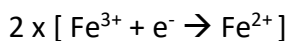


Fe went from  $\text{Fe}^{3+}$  to  $\text{Fe}^{2+}$ . It became less positive by gaining one electron, so it has been reduced.

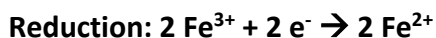
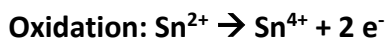


*Step 3:*

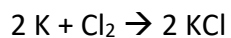
Balance the number of electrons



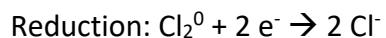
**Correct answer:**



5. Break the following reaction into its oxidation and reduction half-reactions and identify the oxidizing and reducing agent.



*Step 1:*

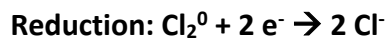


*Step 2:*

Since it has been oxidized,  $\text{K}^0$  is the reducing agent.

Since it has been reduced,  $\text{Cl}_2^0$  is the oxidizing agent.

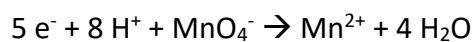
**Correct answer:**



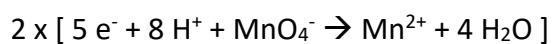
**Reducing agent:  $\text{K}^0$**

**Oxidizing agent:  $\text{Cl}_2^0$**

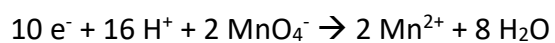
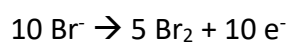
6. Balance and combine the following half-reactions.



*Step 1:*

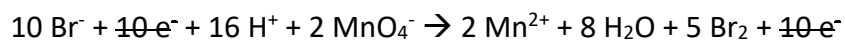


*Step 2:*



*Step 3:*

Combine and cancel out the electrons.



**Correct answer:**

