

| <b>Lesson 5-2: Balancing Redox Reactions</b> |   |
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| <b>Curriculum Expectations</b>               | <ul style="list-style-type: none"> <li>• F2.1</li> <li>• F2.2</li> <li>• F2.3</li> </ul>  |
| <b>Learning Goals</b>                        | <p><b>Learning Goals:</b></p> <ul style="list-style-type: none"> <li>• Discover techniques to balance redox reactions including the oxidation numbers method and the half-reaction method.</li> <li>• Explore techniques for balancing redox reactions that occur in acidic and basic solutions</li> </ul>  |
| <b>Success Criteria</b>                      | <p>I know I have achieved the goals for this lesson when I can:</p> <ul style="list-style-type: none"> <li>• Describe how to balance redox reactions using the oxidation numbers method</li> <li>• Balance redox reactions using the oxidation numbers method in, neutral, acidic and basic solutions</li> <li>• Describe how to balance redox reactions using the half-reaction method</li> <li>• Balance redox reactions using the half-reaction method in neutral, acidic and basic solutions</li> </ul> |
| <b>Teacher Prep</b>                          | <ul style="list-style-type: none"> <li>• Print out one or more of the practice worksheets for students to complete in class.</li> </ul>   |

## Minds On

Goal: To reintroduce concepts related to law of conservation of mass, redox reactions and balancing equations.

### 1. Law of Conservation of Mass Review

- To be completed individually or in small groups.
- Once completed, review the results of the lab as a class, focusing on key concepts relating to the inability to create or destroy mass and how this applies to balancing chemical equations.

### 2. Balancing Redox Reactions Discussion

#### Instructions:

- For this activity you will lead a class discussion about balancing equations.
- Begin by asking the class:

***“What does it mean to balance an equation?”***

- Lead the class in this discussion, guiding them towards the topic of the law of conservation of mass and how in a chemical equation the number of atoms on one side of the equation must equal the number of atoms on the other.
- Ask the question:

***“How do charges need to be balanced in a redox reaction?”***

- Lead a discussion on this. You can refer back to the law of conservation of mass, indicating that electrons (and protons) can not be created or destroyed.

## Action

**\*\*Refer to the Differentiation Resources link for additional practice worksheets, and to enrich your classroom teaching using different tools throughout the lesson. \*\***

### 1. Review: Balancing Chemical Equations

- Before beginning this activity, explain that the technique for balancing chemical equations are different than those for balancing redox reactions. Some of the same concepts apply.
- To begin the lesson students will refresh their knowledge of balancing chemical equations.
- This activity is meant as a review of grade 11 concepts, students should be familiar with these techniques.
- Have students navigate the activity individually, followed by a class-wide navigation through the presentations.
- Allow students the chance to answer embedded questions individually before taking up the answers as a class.
- You can call students to the front to attempt to answer the questions, having them talk through their logic.

### 2. 5-2A: Balancing Redox Reactions – Oxidation Numbers Method.

- Before beginning this activity, review content from the previous lesson on assigning oxidation numbers.
- Have students take notes from this section.
- They should produce a step-by-step guide, in their own notes for how to properly balance a redox reaction using the oxidation numbers method.
- After students are given time to review the techniques, review as a class.
- Encourage questions and clear up any misconceptions.
- Have students answer the check your understanding question on their own, followed by taking up the solution together as a class.
- You may choose to assign questions from the practice worksheets at this time to allow students to practice while the technique is fresh.
- Make sure to emphasize that students need to pay attention on assignments and tests for which method the question is asking them to use to balance.

### 3. 5-2B: Balancing Redox Reactions – Half-Reaction Method

- Have students take notes from this section.

- They should produce a step-by-step guide, in their own notes for how to properly balance a redox reaction using half-reaction method.
- Go through the example, together as a class, encouraging questions.
- Have students attempt the check your understanding question on their own.
- Take up the solution as a class after.
- Watch the videos together as a class, pausing along the way to offer additional explanation and to address any questions/misconceptions.
- Make sure students know the different techniques to apply whether in acid or base.
- After students are given time to review the techniques, review as a class.
- Encourage questions and clear up any misconceptions.
- Have students answer the check your understanding question on their own, followed by taking up the solution together as a class.
- You may choose to assign questions from the practice worksheets at this time to allow students to practice while the technique is fresh.
- Make sure to emphasize that students need to pay attention on assignments and tests for which method the question is asking them to use to balance.
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## Consolidation

### 1. Balancing Redox Reactions Review & Practice I & II

- To be completed individually, in small groups in class or at home.
- You may wish to print out the worksheets and have students complete them as a group.
- Take up the answers together the following day.
- Address any misconceptions or questions by reviewing material from the lesson.

### 2. Balancing Redox Reactions Interactive Practice

- To be completed individually either at home or in class.
- You may wish to do this activity as a game for the class, splitting them up into teams and having one member at a time come to the front to try and solve or by having students compete head-to-head to see who can balance faster.

- Answers should be taken up together as a class, identify any issues or areas of weakness and review this material.
- Call on individual students to share their answers and explanations to each question.
- Address any misconceptions or questions by reviewing material from the lesson

### **3. Balancing Redox Reactions Quiz**

- To be completed individually either at home or in class.
- Answers should be taken up together as a class, identify any issues or areas of weakness and review this material.
- Call on individual students to share their answers and explanations to each question.
- Address any misconceptions or questions by reviewing material from the lesson

### **4. 5-2H: Balancing Redox Reactions Assignment**

- To be completed individually.
- Review the assignment beforehand, emphasizing where marks are allocated and proper submission formats.
- Emphasize that students must show and submit all their work and balance the equations using the techniques indicated.

**\*\*Refer to Differentiation Resources for additional practice worksheets, and to enrich your classroom teaching using different tools. \*\***