**Lesson Plan**

**Teacher: Holland Sloan**

**Subject: Chemistry**

**Lesson: Balancing Chemical Equations**

**Standards:** CHEM1.PS1. 2. Demonstrate that atoms, and therefore mass, are conserved during a chemical reaction by balancing chemical equations.

SEP: Using mathematics and computational thinking

CCC: Energy and Matter

DCI: Matter and Its Interactions: Structure and Properties of Matter

**Objectives:** Student will use mathematics and computational thinking to balance chemical reactions highlighting the law of conservation of mass.

**Materials and Resources:** The students will be completing an escape room activity to show mastery of balancing chemical equations. The BreakoutEDU box will be needed as well as a

4-digit lock. Students will need access to the Internet. This can be through computer, tablet, or cell phone. Students only need one access to the Internet per group. All materials for activity are provided in the following link: <file:///C:/Users/hsloan/Downloads/BalancingChemicalEquationsActivityChemistryEscapeRoomScience%20(2).pdf>

**Instructional Procedure:**

**Beginning:** Teacher may choose from one of two introductory activities to begin this lesson. The first choice is the following YouTube video: <https://www.youtube.com/watch?v=yA3TZJ2em6g&t=319s>

This video is a great introductory video over balancing chemical equations. Not only does the instructor explain the process, but he has images of the molecules as he is explaining. This can help students see the qualitative relationship through mathematical and visual representation. For your higher students, this video may be repetitive but extremely helpful to the lower students.

The second option is the following game: <https://phet.colorado.edu/sims/html/balancing-chemical-equations/latest/balancing-chemical-equations_en.html>

This game allows students to recreate digital models of the molecules while balancing the equations. The game starts with easier equations and then increases with difficulty throughout the levels. If you choose to use this activity, it is better for students to work individually. This link can easily be shared through Google Classroom, Remind, or any other communication outlets that the teacher uses. Students can complete this on their cell phone or any electronic device.

**Middle:** The class will begin an escape room activity. Teacher will use the activity from the link provided. The link gives students an access website on their answer sheet. Students will use this access website to submit their answers to receive the final code to “breakout.” The timer should be set based upon students. The most time it should take is one hour, but most students break out within 45 minutes. For an honors class, the timer should be set for 30 minutes or less. Students can unlock the box and receive a prize. This allows students to use their critical thinking skills while also showing mastery of standard. Students will be in groups during this activity and following their assigned roles.

**End/Closure:** When students return to their desks, they will be asked to create and balance their own chemical equation. Students can choose to create a synthesis, decomposition, single replacement, or double replacement equation. Students must choose a metal and nonmetal or polyatomic ion. However, none of the elements used may be the same as the elements used by their seat partner. Students will be asked to share with their seat partner after they have completed their equation. Also, students may not use the same type of reaction as their seat partner. Teacher will deliver instructions on specifications before students begin working on equations. Students must use the correct compound so students will show the balancing of charges in a compound. Students must follow the pattern of the type of reaction. Differentiation could be implemented with this activity by allowing students to receive bonus points or prizes based on the level of difficulty of their chemical equation. After completing the equation, students will share equation with their seat partners and check to make sure all compounds’ charges are balanced, the pattern of equation is followed, and the equation is balanced. Seat partner will state if there are any mistakes on paper but will also explain mistakes to student. Teacher will circulate and listen to discussion as students are explaining their equations.

**Grouping:** Students will be in groups of two to three based upon heterogeneous mixtures. Students will assign roles within their group and make sure the roles are being followed. Suggested roles are as follows: facilitator, communicator, and reporter. The facilitator is responsible for collecting materials and keeping the group on task. The communicator is the only person within the group to ask the teacher questions. Group communication must happen first before the teacher is asked questions. The reporter is responsible for recording data to share with the class/whole group and submits any final paperwork required by the teacher.

**Exit Ticket:** Each student will submit the balanced equation that he/she designed with notes from his/her seat partner.