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| **TEAM Lesson Plan Template** | |
| Teacher: Holland Brewer | |
| Subject/Grade: High School Chemistry 1 | |
| Lesson Title: Balancing Chemical Equations | |
| **STANDARDS** | **Identify what you intend to teach.** State, Common Core, ACT College Readiness Standards and/or State Competencies; Enduring Understandings and Essential Questions. |
| CHEM1.PS1 2) Demonstrate that atoms, and therefore mass, are conserved during a chemical reaction by balancing chemical equations.  This lesson emphasizes:  SEP: Using mathematics and computational thinking  CCC: Energy and matter  Learning performance: Student will use mathematics and computational thinking to balance chemical reactions highlighting the law of conservation of mass. | |
| **OBJECTIVE(s)/Sub-Objectives** | **Connect prior learning to new learning.** Clear, Specific, Observable, Demanding, High Quality, Measurable, Aligned to Standard(s), and Integrated with other subjects, build on prior student knowledge  Student-Friendly (I Can Statement) |
| I can balance a chemical reaction equation. | |
| **MATERIALS AND RESOURCES** | **Content-related:** Clearly supports lesson objective(s); rigorous & relevant; Incorporates multimedia & resources beyond the textbook. |
| **Activities & Materials**  **Per group/pair**: Breakout EDU Box; 4 Digit Lock; Access to the internet on a computer, tablet, or cell phone. Worksheets from the attached file “BalancingChemicalEquationsActivityChemistryEscapeRoomScience(1).pdf”, calculator  **Per class**: White board and Projector/computer/screen/internet access. Teacher needs to know the temperature (presumably from looking at thermostat) and atmospheric pressure (from TV or <https://weather.com/weather>).  **What if the technology is not working?** Delay the activity if the eye wash station is not operational. If the projector is not working, skip the video.  **Routine for distributing materials:** Place each groups’ materials at the group table before class. Students will come to a central location to get HCl and a separate, nearby location with a balance to get baking soda. Students will carry HCl in their graduated cylinder and will carry their baking soda in a weight boat. | |
| **ACCOMMODATIONS/ADAPTATIONS** | **Learning styles and interests.** Anticipate learning difficulties, regularly incorporate student interests & cultural heritage; differentiate instructional methods. |
| **Modifications/Plans for Diverse Learners *(NOTE: Clearly identify where you will use each of these in your lesson; do not just check the box!)***  **Differentiation**  **\_\_\_\_ Flexible Grouping**  **\_\_\_\_ Other**  **Accommodations**  **\_\_\_ Preferential Seating \_\_\_ Extended Time \_\_\_ Small Group \_\_\_ Peer Tutoring**  **\_\_\_ Modified Assignments \_\_\_ Other**  **Early Finishers:** | |

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| **MOTIVATING STUDENTS/ANTICIPATORY SET** | **“Hook”: Engage students’ attention and focus on learning.** Personally meaningful and relevant. |
| Either: Present the following video: <https://www.youtube.com/watch?v=yA3TZJ2em6g&t=319s>  which demonstrates equation balancing.  or  Play the following game: <https://phet.colorado.edu/sims/html/balancing-chemical-equations/latest/balancing-chemical-equations_en.html> which allows students to create virtual models of molecules from equations as they balance the equation. Students should play individually.  Volunteer: Post the “I can” statements. | |
| **INSTRUCTIONAL PROCEDURES** | **Step-by-Step Procedures-Lesson Sequence: Basic to Complex.** Lesson includes visuals, modeling, logical sequencing and segmenting (beginning, middle, ending); essential information; concise communication; grouping strategies; differentiated instructional strategies to provide intervention & extension; seamless routines; varied instructional strategies; key concepts & ideas highlighted regularly. |
| **Introduction** Previously we have learned to balance equations. Today we are going to balance equations to breakout from an escape room.  There should be a pair or triple at each table. Each group needs a 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 group and submits any final paperwork required by the teacher.  **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.  Students should begin work. The teacher will monitor their progress. Students should discuss the following: the pressure in the room, the temperature, volume of plastic bag, mass of baking soda, and the volume of hydrochloric acid. Students will have to do several conversions to accurately use the ideal gas law. After discussion, students will then be able to state step-by-step procedures by using the guided design questions for the creation of their model airbag. Students will need to show any necessary calculations. If students do not understand molarity, additional instruction may be needed to determine mole value.  **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.  **Motivating Students**  \_x\_ Game This breakout room activity encourages students to work with speed and accuracy.  **Presenting Instructional Content**  \_x\_ Lecture/notes Display Lesson objectives.  \_x\_ Video or game at the beginning of class reminds students of balancing equations.  \_x\_ Guided Practice The instructions in the game provide the steps.  ***Instructional strategies:***  ***Input -* Hook (Set)** There is a brief video or online game to reintroduce equation balancing.  **Modeling and Guided Practice *–*** The online game lays out steps for students.  **Check for Understanding (CFU) –**  ***What am I doing for students that progress at different rates?***  ***What do I do if they get it?***  ***What do I do if they don’t get it?*** | |
| **QUESTIONING/THINKING/PROBLEM SOLVING (embedded throughout)** | **Balanced mix of question types.** Utilizes Blooms Taxonomy/Webb’s Depth of Knowledge; high frequency; purposeful & coherent; require active responses; balance based on volunteers/non-volunteers, ability, & gender; lead to further inquiry & self-directed learning.  **Implement four types of thinking (Analytical, Practical, Creative, & Research-based) & Teach/Reinforce problem-solving types**. Provide opportunities for students to generate ideas & alternatives; analyze, evaluate & explain information from multiple perspectives& viewpoints. |
| **Questioning** These questions will occur throughout the activity as prompts based on groups’ or individual students’ progress.  **Knowledge:**  **Comprehension:**  **Application:**  **Analysis:**  **Synthesis:**  **Evaluation:**  **Thinking**    \_\_ **Practical** –This activity does not involve an automotive air bag, but it does involve an actual air bag, and students actually have to inflate it.  \_\_ **Creative**– The activity begins with students defining the problem of creating an airbag and designing a solution.  \_\_ **Analytical** – Students **compare** quantities in different units and convert moles to mass. Students **evaluate** the success or failure of their design and **explain** what went well or went wrong.  \_\_ **Research-based** – Students design a solution, test it, and then evaluate the result. Then they update the design and test again.  **\*What am I going to do to give Students an opportunity to?**  **1. Generate variety of ideas:**  **2. Analyze problems from multiple viewpoints:**  **Problem Solving *Note: Teach 2 or more types of problem solving (NOTE: Clearly identify where you will use each of these in your lesson; do not just check the box!)***  \_\_\_ **Abstraction**  **\_\_\_ Categorization**  **\_\_\_ Predicting Outcomes**  **\_\_\_ Improving Solutions** | |

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| **GROUPING** | **Maximize student understanding & learning** Varied group composition (race, gender, ability, & age); clearly understood roles, responsibilities & group work expectations; accountability for group & individual work; student opportunities for goal setting, reflection & evaluation of learning. |
| * Heterogeneous groups of two or three * Roles. Facilitator: collect materials and keep group on task; Communicator: may ask teacher questions if no group member can answer the question. Describes group’s design to teacher for approval; Reporter: records data for group and submits paperwork required by teacher. * Group members assign roles and acknowledge their understanding of their role during the lesson introduction. * Transition to groups. Students will begin class at lab tables already separated into groups. The teacher will signal for the whole group’s attention or return students to group work. * Product. The group will produce a completed worksheet. | |
| **ASSESSMENT** | **Formative and/or summative assessment.** A variety of assessments, including rubrics, measure achievement of objectives and informs instruction. |
| ***Assessments: aligned with state stds; measurement criteria; measure student performance in more than 2 ways (project, experiment, presentation, essay, short answer, multiple choice test) (NOTE: Clearly identify where you will use each of these in your lesson; do not just check the box!)***  **\_\_x\_\_ Breakout from escape room**  **\_\_x\_\_ Exit Ticket** described below  *\****Students should achieve \_\_\_\_\_% mastery of this objective: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** | |
| **CLOSURE** | **Reflection/Wrap Up.** Summarizing, reminding, reflecting, restarting, connecting. |
| * ***Review/Summary: wrap up what has been learned and accomplished in the lesson (even if they are in the middle of an exercise, it is still important to summarize to the point where they are now). Ideally involve students in this synthesis.*** * ***Preview for next lesson: link what they did to day with where they are going next.*** * ***Upcoming assignments: remind them of any upcoming assignments.***   ***Today we…. Turn to your partner and…. Let’s review our I Can statements……***  **Here is your exit ticket for today**: Each student will submit the balanced equation that he/she designed with notes from his/her seat partner.  **Follow-up Activities/Extension *These may be designed to create a longer or more intense lesson. For example, if the class is able to cover the material in a lesson much faster than expected, extensions may prove helpful. Extensions may also be useful in various parts of a lesson where the teacher (and class) decides they should spend more time on a skill or topic.***  ***Reflection: You must reflect on every lesson you teach.*** | |

**NOTES:**

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