|  |
| --- |
| **TEAM Lesson Plan Template** |
| Teacher: Holland Brewer |
| Subject/Grade: High School Chemistry 1 |
| Lesson Title: Battery Lab – Ionic and Covalent bonds |
| **STANDARDS** | **Identify what you intend to teach.** State, Common Core, ACT College Readiness Standards and/or State Competencies; Enduring Understandings and Essential Questions. |
| CHEM1.PS2 1) Draw, identify, and contrast graphical representations of chemical bonds (ionic, covalent, and metallic) based on chemical formulas. Construct and communicate explanations to show that atoms combine by transferring or sharing electrons. This lesson emphasizes:Science Practice: Constructing ExplanationsCCC: Structure and FunctionLearning performance: Students will use evidence to explain the nature of ionic bonding in copper (II) chloride highlighting the structure and function of ionic bonds.  |
| **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 knowledgeStudent-Friendly (I Can Statement) |
| I can safely measure quantities and create a solutionI can wash my hands after handling copper chloride. I know not to eat copper chloride or to touch it and touch my face.  I can construct and use an electrolysis device.  |
| **MATERIALS AND RESOURCES**  | **Content-related:** Clearly supports lesson objective(s); rigorous & relevant; Incorporates multimedia & resources beyond the textbook.  |
| **Activities & Materials** **Per student**: Goggles**Per group/pair**: 50mL beaker, 100mL graduated cylinder, distilled water, 0.5 g Copper (II) Chloride, spatula, 2 pieces of pencil lead, 9V battery, 9V battery connector, pencil, Ionic Compound Worksheet, Space at a lab table, White piece of paper. Chart paper or whiteboard space for groups to display their solution diagrams and explanations. Optional: colored pencils. **Per class**: White board and Projector/computer/screen, balance, transparent tape, another set of (50mL beaker, 100mL graduated cylinder, distilled water, Copper (II) Chloride, spatula, pencil lead, 9V battery, 9V battery connector), eye wash station. **What if the technology is not working?** **Routine for distributing materials:** Place each groups’ materials except the distilled water and copper (II) chloride at the group table before class. Students will come to a central location with a balance to get CuCl2 and a separate, nearby location to get distilled water. |
| **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:**  |

|  |  |
| --- | --- |
| **MOTIVATING STUDENTS/ANTICIPATORY SET** | **“Hook”: Engage students’ attention and focus on learning.** Personally meaningful and relevant. |
| Today we get to play with electricity and chemistry. When we connect the two posts of a battery, we complete a circuit, and electricity flows from one post to the other. Can we make electricity flow through a solution? Volunteer: Post the “I can” statements. Ensure that students are wearing their eye protection.  |
| **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** Remind students that copper (II) chloride is toxic. They should not touch their faces while working with the chemical, and they should wash their hands after working with it. Demonstrate how to construct the electrolysis apparatus, and have students construct theirs. Have one member of each group come get distilled water for the group. Have students begin the worksheet. While some group members are observing distilled water in the electrolysis apparatus, have one group member get 0.5 gram of copper (II) chloride. **Middle** Have students continue the lab, observing electrolysis with the copper (II) chloride solution. After ten minutes of observation, regain the whole group’s attention. Show a video describing an ionic compound dissolving in water:<https://www.youtube.com/watch?v=EBfGcTAJF4o><https://www.youtube.com/watch?v=aKGJm6OGJNs>Have students complete the drawings, explanation, and evidence in steps 8 & 9 of the lab. Have students display their work for the class to see. Invite all students to conduct a gallery walk to study each other’s work. **End/Closure**: Regain the whole group’s attention and have them return to their small groups at their lab tables. Demonstrate electrolysis (or the lack thereof) with the solid compound. Ask a student to describe what the lab has demonstrated. Ensure that students properly dispose of their solutions and wash their hands. **Motivating Students** \_x\_ Lab & Verbal reinforcement**Presenting Instructional Content** \_x\_ Lecture/notes Display Lesson objectives.\_x\_ Hands-On This is a lab activity. \_x\_ Guided practice The worksheet provides steps for the lab. ***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:**What is the difference between an ion and an atom? What does the (II) mean in copper (II) chloride? What color is the compound? **Comprehension:** What smell do you detect during electrolysis with distilled water?What smell do you detect during electrolysis with the copper (II) chloride solution? **Application:****Analysis:** **Synthesis:****Evaluation:** **Thinking**  \_\_ **Practical** – Measuring chemicals and constructing the electrolysis apparatus are practical skills. \_\_ **Creative**– Students are asked to draw pictures of ions in solution and to explain these images to classmates. They can be quite creative in this visualization. \_\_ **Analytical** – Students **compare** the behavior of distilled water to the solution and to the solid compound when electricity is applied. Students **explain** their observations in terms of ions.  \_\_ **Research-based** – Students make direct observations of chemical phenomena. **\*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!)*****\_x\_\_ Abstraction** The notion of molecules and ions are abstract explanations of the observed dissolving of the compound in water.  **\_x\_\_ Categorization** Students categorize distilled water, compounds, and solutions into categories of “electrolysis happens” and “electrolysis does not happen.” **\_x\_\_ Predicting Outcomes** Students have the opportunity to make predictions about what will happen at each stage of the lab.  |

|  |  |
| --- | --- |
| **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\_\_ 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**: Explain how the structure of the ionic compound Cooper (II) chloride is related to today’s activity. **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:**

This work is licensed under the Creative Commons Attribution-ShareAlike 4.0 International License. To view a copy of this license, visit <http://creativecommons.org/licenses/by-sa/4.0/> or send a letter to Creative Commons, PO Box 1866, Mountain View, CA 94042, USA.