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| **Lesson Plan:**  |

**Learning objectives**

1. Understand and identify the differences between physical and chemical changes
2. Categorize natural and artificial processes as physical and chemical changes (ex. state changes)
3. Provide examples of chemical and physical changes

**BIs**

1. Classify natural changes in our environment as physical or chemical changes

**PLOs**

**C4** describe changes in the properties of matter

**Skills developed to meet development goals**

1. Critical thinking
2. Self-directed learning
3. Collaborative skills
4. Asking questions
5. Creativity
6. Leadership

**Material and equipment needed**

**-** Paper

- Projector

- Pens and pencils (different colored would be nice)

**Assessment Plan:**

**Formative -** Inquiry undemonstration handed in, student directed note taking in class

**Hook and Introduction**

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| **Time** | **Activity** | **Teaching notes** | **Assessment** |
| 15 min | * Check in with students for long weekend (5m)
* Time emphasis (2m)
* Expectation changes? Suggest "be reasonable" and check for agreement (5m)
 | * Announce students can write down a suggestion with or without name and hand it to me at the end of class today
 | * N/A
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**Development**

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| **Time** | **Activity** | **Teaching notes** | **Assessment** |
| 10 min | Discussion on the Inquiry undemonstration and the Instasnow article  | * Check in with students to see how they found the homework
* Ask students if they would like to share their findings for the inquiry undemonstration, and how they used science to explain their findings. Does anyone want to share a problem this product could solve?
* Reflection on article - what did they learn from the article? What can they extract from the article that they can help themselves with? How did the boy use Instasnow to solve a problem? What was different than just us making snow? - Can discuss about taking products out of context

Make sure to stress that you are not trying to compare the class to this boy's case but trying to show the qualities to help one become self-directed learners. Tell the class not to be afraid of taking challenges in this class because there is no risk from how they're being assessed. | * Critical thinking - how well are they using science they know to explain the undemonstration?
* Self-directed learning - did they search online for the product itself to see how it worked? How much did they extract from this online resource? How do they know it's a valid website? Reflection from the article can show the learning process.
* Creativity - did any student think outside the box to use the product to solve the problem? - Taking the product outside of its original function?
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| 30 min | * Introduce self-directed learning rubric (10m)
* Goal setting (20m)
 | * Mention: what this is, why I'm doing this, and how you should approach the rubric
* Key pointers: midpoint/endpoint, not-graded, own benefit, should be long term, 5 characteristics, guiding questions
* What does each criteria look like. Emphasize 21st century skills
 | * Hand in goal setting sheet at end of class
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| 10 min | * Group activity with Physical and Chemical changes
 | * Ask students to get into groups of 4 or 5 and share the change example they brought. Other students in the group try to reason out which change it is and justify their choice.
 | * Collaborative - while one students share the example, the rest of the group works together to work out a solution and justify it
* Leadership - observe how students take turns and organize the sharing process. Are roles assigned? Does a student tend to take over or delegate time talking during a discussion?
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| 10 min | * Discussion
 | * Ask the class to come back together and share any tricky examples that the group had trouble with or wasn't sure about. If no one shares, ask one example from each group.
* Go over these examples and ask for class input.
* Teacher tries not to give answer unless students are absolutely stumped.
 | * Self-directed learning - how hard are the examples that students brought to class? Are they challenging themselves and their group? Do the groups speak up if they don't understand something?
* **BI** " Classify natural changes in our environment as physical or chemical changes**" -** do they get this?
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**Closure**

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| **Time** | **Activity** | **Teaching notes** | **Assessment** |
| 5 min | * Idea of size of atom
 | http://learn.genetics.utah.edu/content/cells/scale/Questions: What kind of atoms would you expect find in some of these structures? | **Review Bohr Models!** |