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## Paideia Seminar Lesson Plan

**Text:** The Periodic Table of the Elements

**Grade/Subject:** HS / Science (Chemistry)

**Ideas, Values:** Atom, Chemistry, Electron, Element, Molecule

**Date of Origin:** 7/16/2015

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### Pre-Seminar Content

#### Launch Activity:

Examine historical versions of the Periodic Table of the Elements. Discuss why and how scientists have expanded and revised the Periodic Table through the centuries.

#### Inspectional Read:

Have students examine the text without reading it. Have them list the interesting parts that they see, including: rows, periods, and groups. Then have them choose one element in isolation and consider what information is contained in the graphic representation of each element. Discuss with the entire class.

#### Background Information:

The periodic table is a tabular arrangement of the chemical elements, organized on the basis of their atomic number (number of protons in the nucleus), electron configurations, and recurring chemical properties. Elements are presented in order of increasing atomic number, which is typically listed with the chemical symbol in each box. The standard form of the table consists of a grid of elements laid out in 18 columns and 7 rows, with a double row of elements below that. The table can also be deconstructed into four rectangular blocks: the s-block to the left, the p-block to the right, the d-block in the middle, and the f-block below that.

The rows of the table are called periods; the columns are called groups, with some of these having names such as halogens or noble gases. Since, by definition, a periodic table incorporates recurring trends, the table can be used to derive relationships between the properties of the elements and predict the properties of new, yet to be discovered elements; it

is a framework for analyzing chemical behavior, and so the table, in various forms, is widely used in chemistry and other sciences.

## **Vocabulary:**

Reread the *Background Information* on the Periodic Table (see above) while students identify any unfamiliar terms, including but not limited to: atomic number, electron, neutron, column, row, period, nucleus. Then hand out enlarged copies of the graphic representation of individual elements and have the students work in small groups to label all the various forms of information that are given for each element.

## **Analytical Read:**

Divide the class into four groups and assign one of the four blocks (the s-block to the left, the p-block to the right, the d-block in the middle, and the f-block below that) to each group. Have each group label and define the block of elements by their common characteristics. Have each group present the nature of that block or group to the entire class while all the participants take notes.

## **Pre-Seminar Process:**

- ✓ **Define and State the purpose for the seminar.**

*“A Paideia seminar is a collaborative, intellectual dialogue about a text, facilitated with open ended questions.*

*“The main purpose of seminar is to arrive at a fuller understanding of the textual ideas and values, of ourselves, and of each other.*

- ✓ **Describe the responsibilities of facilitator and participants.**

*“I am primarily responsible for asking challenging, open-ended questions, and I will take a variety of notes to keep up with the talk turns and flow of ideas. I will help move the discussion along in a productive direction by asking follow-up questions based on my notes. “I am asking you to think, listen and speak candidly about your thoughts, reactions and ideas. You can help each other do this by using each other’s names.*

*“You do not need to raise your hands in order to speak, rather, the discussion is collaborative in that you try to stay focused on the main speaker and wait your turn to talk.*

*“You should try to both agree and disagree in a courteous, thoughtful manner. For example, you might say, ‘I disagree with Joanna because...,’ focusing on the ideas involved not the individuals.*

- ✓ **Have participants set a Personal Goal.**

*“Now, please reflect on how you normally participate in a discussion as a group. What goal can you set for yourself that will help the flow and meaning of the seminar? “Please consider the list of personal participation goals – either on the Speaking and Listening Checklist or on the board.”*

- ✓ To speak at least three times
- ✓ To refer to the text
- ✓ To ask a question
- ✓ To speak out of uncertainty
- ✓ To build on others’ comments

*“Is there one that is relevant for you? Please choose one goal from the list or that you feel is best and commit to achieving it during the discussion we are about to have... write down (or circle) your personal goal.”*

- ✓ **Agree on a Group Goal.**

*For this seminar, I will suggest our group goal (select display for all to see).*

## **Seminar Questions:**

- ✓ **Opening (Identify main ideas from the text):**
  - ❖ What is the single, most important piece of information provided by the Periodic Table? (round-robin response)
  
  - ❖ How is that information represented and why is it important? (spontaneous discussion)
  
- ✓ **Core (Analyze textual details):**
  - ❖ Based on the Periodic Table, what is an *element*? Refer to the text.
  
  - ❖ In what ways is an element different from an atom? Refer to the text.
  
  - ❖ Compare Hydrogen and Helium (or any two appropriate elements from opposite sides of the Periodic Table). How are they alike? How are they different?
  
  - ❖ How are those similarities and differences represented in the Table?
  
  - ❖ How is an element’s atomic number derived? Why is the atomic number important?
  
  - ❖ Between elements #56 and #72, the Periodic Table seems to break down. What phenomenon is represented at that point in the table?

✓ **Closing (Personalize and apply the ideas):**

- ❖ In the past 50 years, there have been a number of attempts to re-design the Periodic Table. How would you redesign it to make it either more useful or more accurate?

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## Post-Seminar Process:

*“Thank you for your focused and thoughtful participation in our seminar”.*

✓ **Have participants do a written self-assessment of their personal goal.**

*“As part of the post-seminar process, I would first like to ask you to take a few minutes to reflect on your relative success in meeting the personal process goal you set prior to beginning the discussion. Please review the goal you set for yourself and reflect in writing to what extent you met the goal. In addition, note why you think you performed as you did”. (Pause for reflection.)*

✓ **Do a group assessment of the social and intellectual goals of the seminar.**

*“Now I would like us to talk together about how we did in relation to the group goal we set for ourselves (insert your group goal). On a scale of one to five, five being perfect, how would you say we did? Why?” (Pause for discussion.)*

*“Now, would someone be willing to (volunteer) to share your personal self-assessment and reflection?”*

✓ **Note reminders for the next seminar.**

## Post Seminar Content:

✓ **Transition to Writing:**

Have students work in small groups (2-3) with partner(s) to “cut up” the Periodic Table and using construction paper, glue, tape, etc. design their own Periodic Tables that will make the chemical concepts represented there easier to understand.

✓ **Writing Task:**

Why is your version of the Periodic Table more useful for high school Chemistry students than the standard version? After reading and discussing the standard Periodic Table of the Elements, write an essay addressing Chemistry teachers in which you compare the version that you and your partner(s) created with the standard version and argue why your version is more helpful to high school students. Support your position with evidence from the text.

✓ **Brainstorm:**

Invite participants to talk with their design partner(s) for two minutes to share thoughts about what the writing task is asking.

✓ **Structure the Writing:**

Allow a few minutes for all to draft a comparison outline for their essays and use the outline to refine their thinking. Have students use an organizational template as needed.

✓ **First Draft:**

Challenge all to draft their comparison essays by writing the paragraphs defined by their outlines. Encourage the writers to refer to both Periodic Tables in detail to illustrate the various arguments they are making.

✓ **Collaborative Revision:**

Have participants work in pairs (not their original design partners) to read their first drafts aloud to each other with emphasis on reader as creator and editor. Listener says back one point heard clearly and asks one question for clarification. Switch roles. Give time for full revisions resulting in a second draft.

✓ **Edit:**

Once the second draft is complete, have participants work in groups of three-four (again, not their design partners) and this time take turns reading each other's second drafts slowly and silently, marking any spelling or grammar errors they find. (Have dictionaries and grammar handbooks available for reference.) Take this opportunity to clarify/reteach any specific grammar strategies you have identified your students needing. Give time for full revisions resulting in a third and final draft.

✓ **Publish:**

Publish on a class website the final copies of the resulting comparison essays along with photographs of the alternate versions of the Periodic Table so that other high school chemistry teachers and students can use them in their classrooms.

**This Paideia Lesson Plan was created by:**

**Name:** Terry Roberts

**Organization:** National Paideia Center

**\*Text is attached if open sourced.**

**\*Text is cited if it needs to be procured.**

The text for this seminar is the standard “classroom version” of the Periodic Table of the Elements. Before implementing this seminar, be sure to compare the seminar questions to the version of the text in use to be sure that the wording of the questions align with the table you’re using.