Tiferes Bais Yaakov

Name: _____
Date:
Teacher: Julie Uehling
Course: Chemistry, Grade 11, University

Periodic Trends

Students will complete an analysis of periodic trends.

Expectations: B2, B3, A1, A1.11, A1.12, B2.1, B2.2, B3.3

Criteria	Level 4 (80% - 100%)	Level 3 (70% - 79%)	Level 2 (60% - 69%)	Level 1 (50% - 59%)
Communication				
communicate information using an appropriate format	demonstrates a high level of ability to communicate information using an appropriate format	demonstrates considerable ability to communicate information using an appropriate format	demonstrates some ability to communicate information using an appropriate format	demonstrates limited ability to communicate information using an appropriate format
use appropriate numeric, symbolic, and graphic modes of representation, and appropriate units of measurement	expertly uses appropriate numeric, symbolic, and graphic modes of representation, and appropriate units of measurement	competently uses appropriate numeric, symbolic, and graphic modes of representation, and appropriate units of measurement	adequately uses appropriate numeric, symbolic, and graphic modes of representation, and appropriate units of measurement	uses appropriate numeric, symbolic, and graphic modes of representation, and appropriate units of measurement, with assistance
use appropriate scientific vocabulary	always or almost always uses appropriate scientific vocabulary	often uses appropriate scientific vocabulary	sometimes uses appropriate scientific vocabulary	rarely uses appropriate scientific vocabulary
Inquiry				
study data involving periodic properties to recognize trends in the periodic table	studies data involving periodic properties to recognize trends in the periodic table with excellent success	studies data involving periodic properties to recognize trends in the periodic table with considerable success	studies data involving periodic properties to recognize trends in the periodic table with some success	studies data involving periodic properties to recognize trends in the periodic table with limited success
gather and interpret experimental data	gathers and interpret experimental data using excellent critical thinking	gathers and interpret experimental data using good critical thinking	gathers and interpret experimental data using some critical thinking	gathers and interpret experimental data using limited critical thinking
Making Connections				
evaluate information to determine main ideas	evaluation of information to determine main ideas demonstrates thorough understanding	evaluation of information to determine main ideas demonstrates considerable understanding	evaluation of information to determine main ideas demonstrates some understanding	evaluation of information to determine main ideas demonstrates limited understanding
evaluate information to reach conclusions	evaluates information to reach conclusions with thorough supporting detail	evaluates information to reach conclusions with considerable supporting detail	evaluates information to reach conclusions with some supporting detail	evaluates information to reach conclusions with limited supporting detail

Knowledge and Understanding				
demonstrate understanding of topic under study	demonstrates thorough understanding of topic under study	demonstrates considerable understanding of topic under study	demonstrates some understanding of topic under study	demonstrates limited understanding of topic under study
describe concept providing details	description of concept provides thorough details	description of concept provides considerable details	description of concept provides some details	description of concept provides limited details
explain concept providing details	explanation of concept provided thorough details	explanation of concept provided considerable details	explanation of concept provided some details	explanation of concept provided limited details

SCH3U
Mrs. Uehling

Name_____

Trends in the Periodic Table

Using Nelson Chemistry 11, pp. 30-41&70, a separate sheet of paper to answer the questions in complete sentences and a piece of graph paper, students will complete the following analysis considering the modern theory of atomic structure. Students may also use Excel to construct their graphs.

1. Define the terms: atomic radius and ionization energy.

2. On a piece of graph paper, draw a line in the middle of separating the page into top and bottom.

a. On the top, plot a graph of ionization energy (y-axis) vs. atomic number (x-axis) for the first 36 elements.

b. On the bottom plot a separate graph of atomic radius vs. atomic number for the first 36 elements.

c. For each graph connect successive dots with straight lines. Also, ensure that identical atomic numbers are plotted on the same vertical position on the sheet (i.e. atomic number 1 in the top graph should be on the same line as atomic number 1 in the bottom graph).

3. Examine your graph of ionization energy (IE) vs. atomic number.

a. Which elements are found at the main peaks on your graph? What do these elements have in common?

b. Which elements are found at the main valleys on your graph? What do these elements have in common?

4. Examine your graph of atomic radius (AR) verses atomic number.

a. Which elements are found at the peaks on your graph? What do these elements have in common?

b. Which elements are found at the valleys on your graph? What do these elements have in common?

5. Describe the relationship between AR and IE. (i.e. as AR increases, what happens to the IE?)

a. Generally, as you go from left to right across a period on the periodic table, what happens to AR?

b. Generally, as you go from left to right across a period on the periodic table, what happens to IE?

6. What happens to the number of protons in the nucleus as you go across a period? Use this to explain the trends in AR and IE across a period.

7. Generally, as you go down a group in the periodic table, what happens to AR and IE?

a. Explain why AR increases as you go down a group?

b. Explain why an increase in radius makes it easier to lose an outer electron (i. e. give a lower IE value)? (i.e. lose an outer electron)? gain an outer electron)?

8. When sodium forms a positive ion (or cation), it loses its outer electron to become Na^+.

a. Draw Bohr diagrams for Na and Na^+.

b. Using the diagrams on p. 37, how does the ionic radius of a cation compare to its atomic radius?

c. What element does Na^+ resemble (with respect to its electron arrangement)?

d. In general, which group's electron arrangement do the alkali metals resemble when they form cations.

9. When chlorine forms a negative ion (or anion), it gains an outer electron to become Cl^-.

   a. Draw Bohr diagrams for Cl and Cl^-.

   b. Using the diagrams on p. 37, how does the ionic radius of an anion compare to its atomic radius?

   c. What element does Cl^- resemble (with respect to its electron arrangement)?

   d. In general, which group's electron arrangement do the halogens resemble when they form anions (i.e.

10. Define electron affinity.

a. In which corner of the periodic table is it highest? In which corner is it lowest?

b. Considering atomic structure, explain why this is so.

11. Define electronegativity. (p.70)

a. Where on the periodic table is it highest? Where is it lowest?

b. Considering the previous trends, explain why this is the case.

12. On p. 41, there is a diagram showing trends in the periodic table. There is one group that is usually ignored because it does not follow these trends. Which group is usually ignored?