CST: - -
Chem: 1g. 1i 1j
1& E: 1e, 1g 1i

Life On the Edge

Chemcatalyst:

Q: Where are these atoms located on the P.T.?

A:

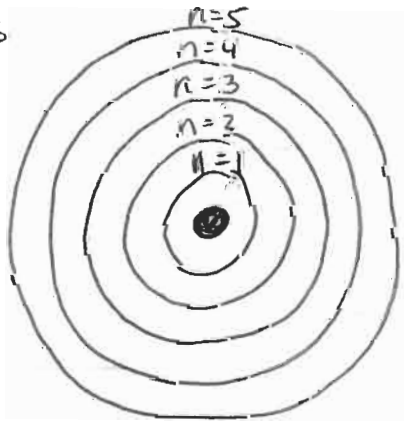
Q: What do you think might be responsible for their similar properties?

A:

Notes:

- How are e- arranged in an atom?

- e- move around the nucleus in energy levels/shells
  - each shell denotes the e-'s energy level
  - lowest energy near the nucleus, highest farther from nucleus
- energy levels are actually 3-D "clouds" that e- move in, but when we draw them we use circles



energy level/ Shell #

Shell #	e-max
n = 1	2
n = 2	8
n = 3	18
n = 4	32
n = 5	50

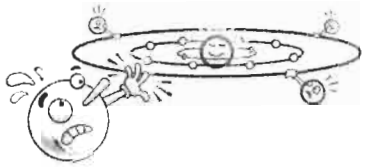
- each e- shell/energy level can only hold a specific maximum # of e-
  - $e\text{-}max = 2n^2$

LESSON 18
CLASSWORK

Life on the Edge
Valence and Core Electrons

Name _____

Date _____ Period _____



Purpose

To discover the arrangements of electrons within atoms.

Instructions

Complete the table on the handout, filling in the missing atoms. Then answer the questions.

1. How does the number of electrons change as you move from left to right across a period?

2. What do all the atoms of Group 1A elements have in common?

3. List three things that all the atoms of the elements in period 3 have in common.

4. Which atoms have two electrons in the first shell and eight electrons in the second shell?

5. What happens to the electron count and the number of shells when you move from neon, Ne, to sodium, Na?

6. How many shells of electrons does rubidium, Rb, have? How many electrons are in the outermost shell? Draw a shell model of a rubidium atom.

7. Draw a shell model of an atom with two shells and six electrons. What element is this? How many electrons are in the outermost shell?

8. Draw a shell model of an atom with three shells and two electrons in the outermost shell. How many total electrons does this atom have? What element is this?

9. Look at the periodic table and the handout The Shell Model. Explain why the number of electrons in the third shell suddenly changes from 8 to 18 between the element calcium, Ca, and the element gallium, Ga.

10. Summarize at least three patterns you discovered during this lesson.

11. **Making Sense** Explain how you can determine the arrangement of an element's electrons from the element's position in the periodic table.

12. **If You Finish Early** Predict the electron arrangement of tin, Sn. Draw a shell model of it. Explain your reasoning.

Making Sense Notes:

Q: What does the P.T. tell us about e⁻ arrangement?

- Atomic # = # of e⁻ (in a neutral atom #protons = # electrons)
- Group "A" # = # of valence e⁻
  - Valence e⁻ = e⁻ in outer most energy level/shell
  - core e⁻ = all other e⁻ in the inner energy levels/shells
    - # core e⁻ = (atomic #) − (Group #)
- Across a period (skip transition metals), the # of valence e⁻ increases by 1
- * Elements with the same # of valence e⁻ have similar properties
- Down a group → the # of energy levels/shells around nucleus increases by 1
- Period # = energy levels/shell #

Q: How are electrons further organized?

- each e⁻ energy level/shell is made up of sublevels/subshells that further organize the e⁻ around the nucleus
  - e⁻ in a specific subshell move around the nucleus in distinct patterns
    - s subshell = spherical shape (1)
    - p subshell = dumbbell shape (3)
    - d subshell = flower shape (5)
    - f subshell = all kinds of shapes (7)

Check-In:

Q: For element #34:

a) Selenium Se c) 34 e) 6 g) O, S, Te, Po
b) 34 d) 28 f) 6