

### Light and the Bohr Model

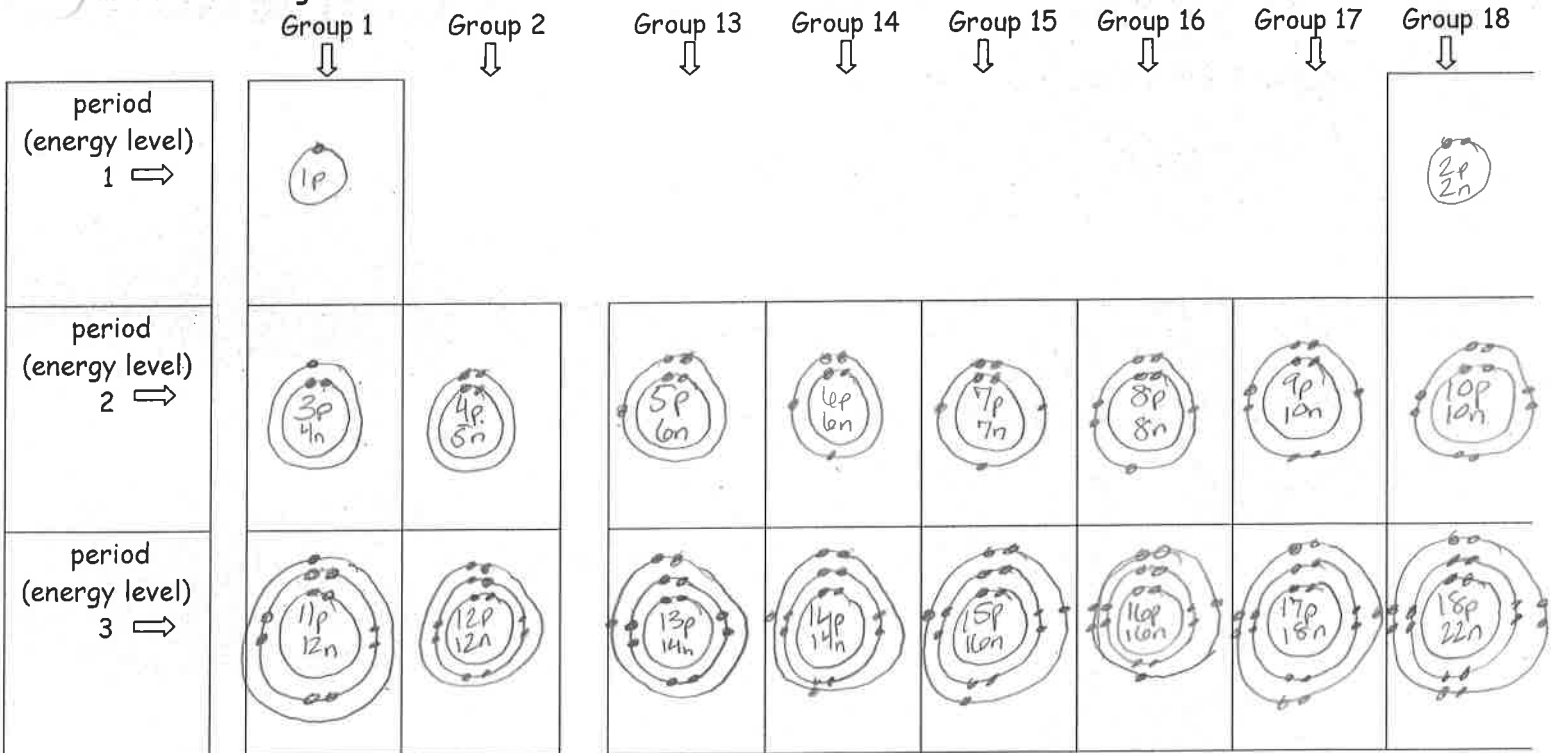
- Electrons lose energy as they fall from a higher energy level to a lower one.
- This energy is emitted in the form of electromagnetic radiation (light) - some of which is in the visible spectrum.
- Using the energy in joules (j) associated with each energy level (the table on the right), calculate the energy of radiation emitted from the hydrogen atom for the following energy jumps (falls) of the electron.

	From energy level	To energy level	Amount of energy lost (j)	Visible light?
a)	2	1	$1.63 \times 10^{-18} \text{ j}$	no
b)	3	1	$1.94 \times 10^{-18} \text{ j}$	no
c)	3	2	$0.31 \times 10^{-18} = 3.1 \times 10^{-19}$	yes
d)	4	2	$0.41 \times 10^{-18} = 4.1 \times 10^{-19}$	yes
e)	5	2	$0.46 \times 10^{-18} = 4.6 \times 10^{-19}$	yes
f)	5	3	$0.15 \times 10^{-18} = 1.5 \times 10^{-19}$	no
g)	6	5	$0.03 \times 10^{-18} = 3 \times 10^{-20}$	no
h)	6	4	$0.08 \times 10^{-18} = 8 \times 10^{-20}$	no

Energy of each level (j)

6	$2.12 \times 10^{-18} \text{ j}$
5	$2.09 \times 10^{-18} \text{ j}$
4	$2.04 \times 10^{-18} \text{ j}$
3	$1.94 \times 10^{-18} \text{ j}$
2	$1.63 \times 10^{-18} \text{ j}$
1	0 j

Draw the Bohr diagrams for the first 18 elements



Study the table and answer the following questions.

1. How does each element relate to the one above it and/or below it in the same group?

Same # of outside (valence) electrons

2. How does each element relate to the one before it or after it in the same period with regards to

a) protons

+1

b) electrons

+1

c) neutrons

+ ~ 1

3. How are the atomic numbers, the number of neutrons and the mass numbers related?

$$\text{mass number} = \text{atomic number} + \text{neutrons}$$

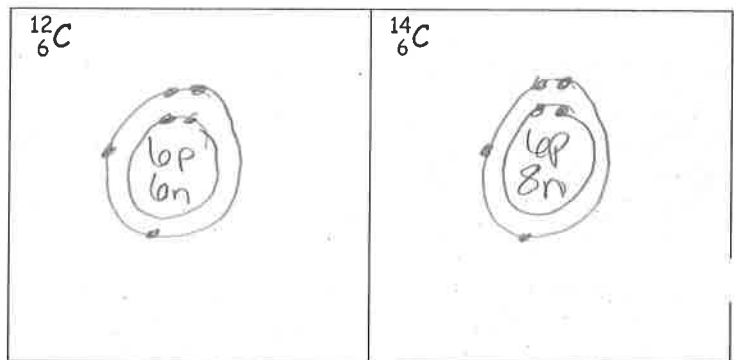
4. What is the maximum number of electrons in

a) the first energy level (first shell) 2

b) the second energy level (second shell) 8

c) the third energy level (third shell) 8

5. Draw the Bohr Model for each of the following two isotopes of carbon.



6. What is the difference between the two isotopes of carbon in question 5?

neutrons

7. Based on your drawing in question 5 and answer to question 6, define isotope.

same element, different mass

8. Find carbon on the periodic table. What is the most common isotope of carbon? How can you tell?

Carbon 12, atomic mass of 12.01 amu rounds to 12

9. Give the symbol and Bohr Model of the most common isotope of oxygen.



10. Propose a second isotope of oxygen, give its symbol and draw it.

