High School Science Virtual Learning

College Chemistry
Atomic Structure & Periodic Trends
Virtual Lab

May 20, 2020

High School College Chemistry
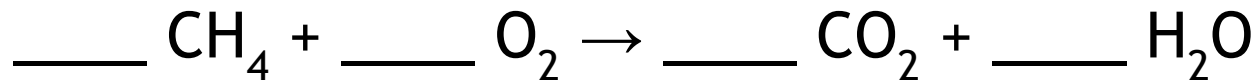Lesson: May 20, 2020

Objective/Learning Target:
Students will complete lab activities to learn about atomic structure and periodic trends.
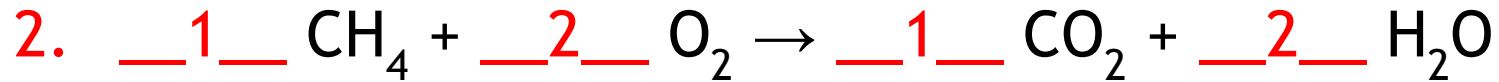
Let's Get Started:

1. What are the 5 different types of chemical reactions?

2. Balance the following chemical reaction.

$$\_\_\_\_ \; CH_4 + \_\_\_\_ \; O_2 \rightarrow \_\_\_\_ \; CO_2 + \_\_\_\_ \; H_2O$$

Let's Get Started: Answer Key

1. Single Replacement, Double Replacement, Synthesis/Combination, Decomposition, and Combustion.

2. __1__ CH_4 + __2__ $O_2 \rightarrow$ __1__ CO_2 + __2__ H_2O

Lesson Activity:

- Just like the lessons from earlier this week, this activity will be split between two days.
- Today you will watch the lab video and complete the lab worksheet. There are some new concepts, so there are some additional notes added after the lab.
- Tomorrow you will check your answers and watch a deeper explanation of the lab.

Lesson Activity:

Directions
- Watch this video.
- Answer the questions on your lab worksheet.
- The data for the lab worksheet can be found here.

- Video
  - To better understand the process occuring during a flame test please watch this Flame Test Explained Video.

- It is possible to calculate the wavelength and frequency of the light being given off using the speed of light equation seen below:
  - c = speed of light = 3.00 x 10^8 m/s
  - λ = wavelength in meters (m)
  - v = frequency in per seconds (/s) or Hertz (Hz)

$$c = \lambda v$$

- We are also able to calculate the amount of energy of the light if the frequency is known, as seen to the right.
  - h = Planck's constant = 6.626 x 10^{-34} J s
  - E = energy in Joules (J)

$$E = hv$$

- Watch the following Organic Chem Tutor Video on how to use these equations. Make note of the example problems.

Practice

Complete the following questions using the information you learned during the lesson activity.

Questions:

1. A wave has a frequency of 22 Hz. Find its wavelength.
2. What is the frequency of a wave if its wavelength is 3.6 x 10^{-9} m?
3. A bright line spectrum contains a line with a wavelength of 518 nm. Determine the energy.
4. A photon has an energy of 4.00 x 10^{-19} J. Find the wavelength of the radiation.

Answer Key:
1. 1.4×10^7 m
2. 8.3×10^{16} Hz
3. 3.84×10^{-19} J
4. 4.97×10^{-7} m