Journal Prompts for the next two weeks (Sep 14 through Sep 20). The slide numbers correspond to the file Session02_ALL-CONTENT

These are merely suggestions to take your learning to another level. They are intended to nudge you but they are purposefully not overly descriptive. Take these prompts where you want to based on your personal experience, interests, and creative pursuits.

1) SLIDE #5 - read the article:
https://www.discovermagazine.com/the-sciences/the-impossible-molecules-that-only-appear-in-space
and draw a bonding model that shows how the electrons are organized when H+ and He came together to form the first molecule. Make a drawing that emphasizes that shared electrons are double counted to give filled shells for both the hydrogen and the helium atom. Draw a picture that shows how shared electrons are "double counted" when it comes to filling shells.

2) SLIDE #7 - read the article:
https://pubs.acs.org/doi/full/10.1021/acs.est.6b06095
We normally don't think of methane as being in the air we breath. But in 2014, three Google Street View (GSV) cars collected methane concentration data. Draw the structure of methane and sketch the findings shown in figure 2. What gave rise to the spikes in methane concentration?

3) SLIDE #10 Sum the atomic masses of the atoms in a molecule of water and a molecule of methane. Methane is a gas. Water is a liquid. Compare the electron organization in methane and water. Based on this difference, write a hypothesis that posits why similarly sized molecules behave so differently. It has been argued that "if the properties of water were not almost precisely what they are, carbon-based life would in all probability be impossible (Denton, Nature's Destiny, 1998).

4) Think about SLIDE #14 Then read the Introduction section of the article
https://doi.org/10.1021/acsomega.9b03352 published in January, 2020. Note the statement, "Molecules with relatively weak bonds store chemical energy and release it when chemical reactions result in the formation of the same number of stronger, lower-energy bonds. The authors compare combustion of glucose (equation 1) to the decomposition of fuels and other reactions not involving oxygen. They conclude that the more O2 in the reaction results in the release of more energy,(12,17â^'21) almost regardless of the nature of the fuel molecules or reaction products. Sketch a picture that expresses the molecular species that contains most of the chemical energy in the biosphere. Draw the bonds of oxygen that reflects the "bond strength".

5) See SLIDE #15 The 1954 article connects oxygen poisoning and tissue damage by X-rays. The article mentions ionizing radiation like X-rays produce OHâ€¢. Draw the structure of this highly reactive molecule. Look at the process of photosynthesis and respiration. Draw a picture that shows the molecular similarity between ionizing radiation, photosynthesis, and respiration.

6) SLIDE #16 Listen to the NPR segment from "All Things Considered" on "The extended beauty of photosynthesis".
https://www.npr.org/sections/13.7/2017/06/02/531262435/the-extended-beauty-of-photosynthesis
Interpret, in words or pictures, the meaning of the caption, "Life's chemical symbiosis".

7) SLIDE #18 Draw the molecular structure with all electrons for each species involved in nitrogen fixation.
https://www.nature.com/scitable/knowledge/library/the-nitrogen-cycle-processes-players-and-human-15644632/

8) Study SLIDE 22 In May 2020 evidence was reported on the generation of C2 under mild conditions.
https://chemistrycommunity.nature.com/posts/65867-room-temperature-chemical-synthesis-of-c2-evidence-for-quadruple-bonding-character-and-role-in-nanocarbon-formation At the top of this web page is a picture.
Interpret the electron organization in the diagram labeled "singlet dicarbene" double bond?