Dear AP Chemistry Students,

I am so excited to have you in class as we continue to build Western's AP Chemistry program! The 2020-2021 school year will mark my tenth-year teaching; I have taught Geometry, Earth Science, Environmental Science, Physics, Biology, and Chemistry (both Honors & AP). I taught for 2 years with Teach for America at Northern Nash High School in Rocky Mount, NC, and then for 6 years at Uncommon Collegiate Charter High School in Bedford-Stuyvesant, Brooklyn, NY. This is my second year as a Hornet.

I majored in Biology and minored in Chemistry and Spanish for the Medical Professions at UNC-Chapel Hill. Though my first love was Biology, my favorite course to teach has been AP Chemistry. It is a fascinating and challenging course that supports students in making connections, building strong content knowledge, and developing investigative skill sets. Throughout the year, we will explore and build six big ideas – these are explained below along with a real world connection for why that course of study matters.

Big Idea	Description	Real World Connection
1 *Atoms & Elements*	Chemical elements are fundamental building materials of matter, and all matter can be understood in terms of arrangements of atoms. These atoms retain their identity in chemical reactions.	Want to see something gross? Look up the 'everlasting pill.' Elements in the same family have the same number of valence electrons and therefore exhibit similar behaviors. The primary ingredient in Pepto-Bismol that helps settle your stomach is bismuth, Bi. In the same family is an element named Antimony, Sb, which was used as a laxative in the 18th century. It was called 'everlasting' because it could be passed and recycled by washing and reusing.
2 *Structure & Properties of Matter*	Chemical & physical properties of materials can be explained by the structure and the arrangement of atoms, ions, or molecules and the forces between them.	Diamonds and graphite (found in pencils, commonly called lead) are made of the same element – carbon. In graphite, the carbon atoms are arranged in planar sheets that can easily glide against one another, resulting in the 'shaving' of graphite. In diamond, the carbon atoms are bonded in all directions, forming the really strong properties of diamond (You have to use a laser to cut diamonds!)
3 *Chemical Reactions*	Changes in matter involve the rearrangement and/or reorganization of atoms and/or the transfer of electrons.	When sodium metal is thrown into water, it forms sodium hydroxide and hydrogen gas, generating significant heat. This leads to an explosion. Chlorine gas was used as a chemical weapon in WWI because it reacts with the airway lining of the trachea, forming hydrochloric acid. However, when sodium and chlorine are reacted together, they form sodium chloride, NaCl, commonly known as table salt!
4 *Kinetics*	Rates of chemical reactions are determined by details of the molecular collisions.	Have you ever wondered why the directions on the side of pill bottles are so specific? Why is it recommended that you only take two 200-milligram Advil pills every 4–6 hours? Medication recommendations are based on the rate of decomposition. If you take additional pills before the first ones have decayed, you may build up a toxic level of drugs in your body.
5 *Thermodynamics*	The laws of thermodynamics describe the essential role of energy and explain and predict the direction of changes in matter.	Road salt (the salt spread on roads prior to big winter storms) is generally made up of calcium chloride ($CaCl_2$). The reaction between water and calcium chloride is 'exothermic,' meaning it releases energy as it proceeds. When the calcium chloride and ice combine, heat is released, melting more ice! (If you find this interesting, the other reason road salt works is because of freezing point depression.)
6 *Equilibrium*	Any bond or intermolecular attraction that can be formed can be broken. These two processes are in a dynamic competition, sensitive to initial conditions and external perturbations.	One of the most cited examples of equilibrium is the industrial production of ammonia known as the Haber process. Ammonia is used commonly in fertilizer and supports food production and can be made out of nitrogen and hydrogen gas. Both of these gases are widely available in the atmosphere, but when placed in a container together, they will not readily react. Dr. Haber found that at low temperatures and very high pressures, the product of the reaction (ammonia) is favored.

We will also incorporate the six AP Science practices – (1) use of representations & models, (2) use of mathematics, (3) engage in scientific questioning, (4) plan & implement data collection, (5) analyze and evaluate evidence, and (6) work with scientific explanations and theories.

Summer Work: In order to ensure you are prepared for AP Chemistry, you should complete the summer assignments found on Canvas at this link: https://bit.ly/2ZuJoGT. When you type this URL in, you should click the button that says "Enroll in Course." This will allow you to access the summer assignments. If you need any support, please reach out via email (mccleas@gcsnc.com) or through Canvas messages. **You must have this work completed prior to the start of school.**

See you all soon. Enjoy your summer,

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