**David Brearley High School**

**Chemistry Honors – Mastery List**

**Compiled by: Mr. David Novak**

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**WHAT EVERY STUDENT MUST KNOW BY THE END OF JANUARY YEAR EACH STUDENT WILL BE ABLE TO:**

• Demonstrate the understanding and practice of the scientific method in performing proper handling of chemicals, lab equipment, and all lab safety considerations and guidelines.

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• Perform scientific measurements and apply mathematical operations necessary to analyze data presented or collected in a laboratory experiment.

• Demonstrate the understanding and structure of the atom and the corresponding nucleus including the differences, importance, and location of protons, neutrons, and electrons.

• Use the structure of the atom and electron arrangement to identify and explain the differences between different elements.

• Distinguish between the following types of bonds: ionic, covalent and metallic, and their relationship to atomic structure and develop molecular orbital.

**·** Distinguish between polar covalent and non-polar covalent chemical bonds.

**·** Distinguish between polar covalent and non-polar covalent molecules.

**·** Determine the chemical and physical properties of compounds and molecules based on their polar covalent and/or non-polar covalent chemical bonds and/or polar and non-polar molecules.

• Write chemical formulas and name chemical substances based on their chemical formulas.

• Identify the types of reactions and be able to predict products from given reactants.

• Uphold the Law of Conservation of Matter by identifying and writing balanced chemical reaction equations.

• Uphold the Law of Conservation of Energy by identifying and accounting for transfer of energy and change of states during chemical and physical changes.

• Understand the mathematics of chemistry by using and understanding the concept of the mole.

• Determine, calculate, and examine mathematical relationships in reactions using Stoichiometry calculations.

• Distinguish between the four states of matter by applying the kinetic molecular theory of matter.

**WHAT EVERY STUDENT MUST KNOW BY THE END OF YEAR EACH STUDENT WILL BE ABLE TO:**

• Perform gas law calculations and their applications to everyday life including: Boyles’ Law, Charles’ Law, Avogadro’s Law, Gay-Lussac’s Law, Combined Gas Law, Graham’s Law of Effusion, and the Ideal Gas Law.

• Examine the factors that affect solubility and determine the concentration of solutions by different methods including, temperature, type of solvent (polar or non-polar, ionic or covalent), types of solute (polar or non-polar, ionic or covalent)

• Understand chemical equilibrium and its relationship to Kp, Ke, Ksp, ΔG, ΔS, ΔH, and T.

• Distinguish between acids and bases and relate it to pH.

• Use calorimetric data and calculations to understand enthalpy change and its effect on bond energy.

• Perform mathematical operations necessary to analyze experimental calorimetric data.

• Apply oxidation reduction reactions to the development of voltaic cell and calculations of their electrical potential by experimental data collection.