

High School DCI

Matter and Its Interactions

I Structure and Properties of Matter

- a Structure and Properties of Matter **PS1.A**
 - i Each atom has a charged substructure consisting of a nucleus, which is made of protons and neutrons, surrounded by electrons. **HS-PS1-1**
 - ii The periodic table orders elements horizontally by the number of protons in the atom's nucleus and places those with similar chemical properties in columns. The repeating patterns of this table reflect patterns of outer electron states. **HS-PS1-1**
 - iii The periodic table orders elements horizontally by the number of protons in the atom's nucleus and places those with similar chemical properties in columns. The repeating patterns of this table reflect patterns of outer electron states. **HS-PS1-2**
 - iv The structure and interactions of matter at the bulk scale are determined by electrical forces within and between atoms. **HS-PS1-3**
 - v A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy in order to take the molecule apart. **HS-PS1-4**

II Chemical Reactions

- a Chemical Reactions **PS1.B**
 - i Chemical processes, their rates, and whether or not energy is stored or released can be understood in terms of the collisions of molecules and the rearrangements of atoms into new molecules, with consequent changes in the sum of all bond energies in the set of molecules that are matched by changes in kinetic energy. **HS-PS1-4**
 - ii Chemical processes, their rates, and whether or not energy is stored or released can be understood in terms of the collisions of molecules and the rearrangements of atoms into new molecules, with consequent changes in the sum of all bond energies in the set of molecules that are matched by changes in kinetic energy. **HS-PS1-5**
 - iii In many situations, a dynamic and condition-dependent balance between a reaction and the reverse reaction determines the numbers of all types of molecules present. **HS-PS1-6**
 - iv The fact that atoms are conserved, together with knowledge of the chemical properties of the elements involved, can be used to describe and predict chemical reactions. **HS-PS1-2**
 - v The fact that atoms are conserved, together with knowledge of the chemical properties of the elements involved, can be used to describe and predict chemical reactions. **HS-PS1-7**

III Nuclear Processes

- a Nuclear Processes **PS1.C**
 - i Nuclear processes, including fusion, fission, and radioactive decays of unstable nuclei, involve release or absorption of energy. The total number of neutrons plus protons does not change in any nuclear process. **HS-PS1-8**

IV Structure and Properties of Matter

- a Structure and Properties of Matter **PS1.A**
 - i Attraction and repulsion between electric charges at the atomic scale explain the structure, properties, and transformations of matter, as well as the contact forces between material objects. **HS-PS1-1**
 - ii Attraction and repulsion between electric charges at the atomic scale explain the structure, properties, and transformations of matter, as well as the contact forces between material objects. **HS-PS1-3**

V Optimizing the Design Solution

- a Optimizing the Design Solution **ETS1.C**
 - i Criteria may need to be broken down into simpler ones that can be approached systematically, and decisions about the priority of certain criteria over others (tradeoffs) may be needed. **HS-PS1-6**