

Chemistry 2011-2012 Benchmark Blueprint

Green Dot Public Schools

Assessments

Atomic and Molecular Structure		1	2	3	4
1.0	Students know the periodic table displays the elements in increasing atomic number and shows how periodicity of the physical and chemical properties of the elements relates to atomic structure. As a basis for understanding this concept:				
1.a	Students know how to relate the position of an element in the Periodic Table to its atomic number and atomic mass.	3	3		3
1.b	Students know how to use the Periodic Table to identify metals, semimetals, nonmetals, and halogens.	3	3		
1.c	Students know how to use the Periodic Table to identify alkali metals, alkaline earth metals and transition metals, and trends in ionization energy, electronegativity, and the relative sizes of ions and atoms.	6	3		3
1.d	Students know how to use the Periodic Table to determine the number of electrons available for bonding.	3	3		
1.e	Students know the nucleus is much smaller in size than the atom yet contains most of its mass.	3			
Chemical Bonds					
2.0	Students know biological, chemical, and physical properties of matter result from the ability of atoms to form bonds from electrostatic forces between electrons and protons and between atoms and molecules. As a basis for understanding this concept:				
2.a	Students know atoms combine to form molecules by sharing electrons to form covalent or metallic bonds, or by exchanging electrons to form ionic bonds.	6	3		3
2.e	Students know how to draw Lewis dot structures.	4	3		3
Conservation of Matter and Stoichiometry					
3.0	Students know the conservation of atoms in chemical reactions leads to the principle of conservation of matter and the ability to calculate the mass of products and reactants. As a basis for understanding this concept:				
3.a	Students know how to describe chemical reactions by writing balanced equations.		3		3
3.c	Students know one mole equals 6.02×10^{23} particles (atoms or molecules).		3		
3.d	Students know how to determine molar mass of a molecule from its chemical formula and a table of atomic masses, and how to convert the mass of a molecular substance to moles, number of particles or volume of gas at standard temperature and pressure.		6		3

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Conservation of Matter and Stoichiometry		1	2	3	4
3.e	Students know how to calculate the masses of reactants and products in a chemical reaction from the mass of one of the reactants or products, and the relevant atomic masses. <ul style="list-style-type: none"> •2: Include items not requiring calculators •3: Include items not requiring calculators •4: Include items not requiring calculators 		3	3	3
Gases and Their Properties					
4.0	Students know the kinetic molecular theory describes the motion of atoms and molecules and explains the properties of gases. As a basis for understanding this concept:				
4.b	Students know the random motion of molecules explains the diffusion of gases.			3	
4.c	Students know how to apply the gas laws to relations between the pressure, temperature, and volume of any amount of an ideal gas or any mixture of ideal gases. <ul style="list-style-type: none"> •3: Include items requiring calculations •4: Include items requiring calculations 			6	3
4.f	Students know there is no temperature lower than 0 Kelvin.			3	
Acids and Bases					
5.0	Students know acids, bases, and salts are three classes of compounds that form ions in water solutions. As a basis for understanding this concept:				
5.a	Students know the observable properties of acids, bases and salt solutions.			3	3
5.b	Students know acids are hydrogen-ion-donating and bases are hydrogen-ion-accepting substances.			3	
5.d	Students know how to use the pH scale to characterize acid and base solutions.			3	
Solutions					
6.0	Solutions are homogenous mixtures of two or more substances. As a basis for understanding this concept:				
6.b	Students know how to describe the dissolving process as a result of random molecular motion.			3	3
6.c	Students know temperature, pressure, and surface area affect the dissolving process.			3	

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Solutions	1	2	3	4
<p>6.d Students know how to calculate the concentration of a solute in terms of grams per liter, molarity, parts per million and percent composition. •3: Ensure assessing solubility of solids</p>			3	
Chemical Thermodynamics	1	2	3	4
<p>7.0 Students know energy is exchanged or transformed in all chemical reactions and physical changes of matter. As a basis for understanding this concept:</p>				
<p>7.b Students know chemical processes can either release (exothermic) or absorb (endothermic) thermal energy.</p>			3	3
<p>7.c Students know energy is released when a material condenses or freezes and absorbed when a material evaporates or melts.</p>			3	
<p>7.d Students know how to solve problems involving heat flow and temperature changes, using known values of specific heat, and latent heat of phase change. •3: No heat of vaporization/fusion items, Only heat flow •4: No heat of vaporization/fusion items, Only heat flow</p>			3	3
Reaction Rates	1	2	3	4
<p>8.0 Students know chemical reaction rates depend on factors that influence the frequency of collision of reactant molecules. As a basis for understanding this concept:</p>				
<p>8.a Students know the rate of reaction is the decrease in concentration of reactants or the increase in concentration of products with time.</p>				3
<p>8.c Students know the role a catalyst plays in increasing the reaction rate. •4: Better pacing for CST</p>				3
Chemical Equilibrium	1	2	3	4
<p>9.0 Students know chemical equilibrium is a dynamic process at the molecular level. As a basis for understanding this concept:</p>				
<p>9.a Students know how to use LeChatelier's Principle to predict the effect of changes in concentration, temperature and pressure.</p>				3
<p>9.b Students know equilibrium is established when forward and reverse reaction rates are equal. •4: Better pacing for CST</p>				3

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Organic Chemistry and Biochemistry		1	2	3	4
10.0	Students know the bonding characteristics of carbon allow the formation of many different organic molecules of varied sizes, shapes, and chemical properties and provide the bio-chemical basis of life. As a basis for understanding this concept:				
10.a	Students know large molecules (polymers) such as proteins, nucleic acids, and starch are formed by repetitive combinations of simple sub-units. •1: More specific to macromolecules and subunits - Not just focused on monomers and polymers.	3			
10.b	Students know the bonding characteristics of carbon lead to a large variety of structures ranging from simple hydrocarbons to complex polymers and biological molecules. •1: DNA, carbohydrates, and proteins/enzymes as polymers of monomers	3			
Nuclear Processes					
11.0	Students know nuclear processes are those in which an atomic nucleus changes, including radioactive decay of naturally occurring and human-made isotopes, nuclear fission, and nuclear fusion. As a basis for understanding this concept:				
11.c	Students know many naturally occurring isotopes of elements are radioactive, as are isotopes formed in nuclear reactions.	3			
11.d	Students know the three most common forms of radioactive decay (alpha, beta, gamma) and how the nucleus changes in each type of decay. •1: One each: alpha, beta, gamma	3			
Total Number of Items		40	33	42	48