

Chemistry		2005-06	2006-07	2007-08
1. Standard 1-Math	M1.1 Abstraction and symbolic representation. . .	MC44 CR65 CR84	MC42 MC43 CR51 CR52 CR56	CR54 CR67 CR72
	M2.1 Deductive and inductive reasoning. . .		CR53	
	M3 Critical thinking skills are used in the solution of of mathematical problems. . .	MC35		
	M3.1 Apply algebraic and geometric concepts and skills to the solution of problems. . .	CR70 CR77	CR55 CR58 CR66	
1. Standard 1-Science	S1.1 Elaborate on basic scientific and personal explanations of natural phenomena. . .	MC42 CR82		CR76
	S1.2 Hone ideas through reasoning, library research, and. . .	CR76		CR79
	S3.1 Use various means of representing and organizing observations. . .	CR55 CR67 CR68 CR73	MC49 CR67	
6. Standard 6	KI 3.2 Extend the use of powers of ten notation to understanding the exponential function. . .	CR75		
7. Standard 7-Prob. Solving	1.1 Analyze science, technology and society problems and issues on a community. . .		CR79	
A. Atomic Concepts	3.1a The modern model of the atom has evolved over a long period. . .			MC04
	3.1b Each atom has a nucleus, with an overall positive charge, surrounded by. . .		MC02 CR72	
	3.1d The proton is positively charged, and the neutron has no charge. The electron. . .			MC03

	3.1e Protons and electrons have equal but opposite charges. . .	MC32		MC02
	3.1f The mass of each proton and each neutron is approximately equal to one. . .	CR53	MC04	
	3.1h In the wave-mechanical model (electron cloud model) the electrons are in orbitals	MC50	MC01	MC31
	3.1j When an electron in an atom gains a specific amount of energy, the electron. . .		MC31 MC37	
	3.1k When an electron returns from a higher energy state to a lower energy state. . .	CR83		CR73
	3.1l The outermost electrons in an atom are called the valence electrons. . .	CR54	CR74	
	3.2l An electronic cell requires electrical energy to produce a chemical change.			MC01
B. Periodic Table	3.1aaThe succession of elements within the same group demonstrates. . .	MC02 MC31	MC32 CR75	
	3.1g The number of protons in an atom (atomic number) identifies the element. . .	MC01 MC04 MC34	MC33	MC05 MC33
	3.1v Elements can be classified by their properties and located on the Periodic Table. . .		CR76	
	3.1vv Arrhenius acids yield H+ (aq), hydrogen ion as the only positive ion. . .	MC03		
	3.1w Elements can be differentiated by physical properties. . .		MC05 MC34 CR73	MC35
	3.1z For groups 1, 2, and 13-18 on the Periodic Table, elements within the same group have the . .		MC06	MC32
	3.1z For Groups 1, 2, and 13-18 on the Periodic Table, elements within the same group. . .	MC36 CR72		

	5.2f Some elements exist in two or more forms in the same phase. These forms. . .	MC05		
C. Moles/Stoichiometry	3.1cc A compound is a substance composed of two or more different elements that. . .	MC06	MC07 MC19 MC36 MC39	MC08 CR65
	3.1ee Types of chemical formulas include empirical, molecular, and structural.		MC38	CR66
	3.2b Types of chemical reactions include synthesis, decomposition, single. . .	MC08		
	3.3a In all chemical reactions there is a conservation of mass, energy, and charge.			MC07 MC36
	3.3c A balanced chemical equation represents conservation of atoms. . .	MC07 MC46 CR69	CR59	MC42 CR74
	3.3d The empirical formula of a compound is the simplest whole-number ratio. . .	MC33 CR51		
	3.3e The formula mass of a substance is the sum of the atomic masses of its atoms.			CR55 CR56
	3.3f The percent composition by mass of each element in a compound can be. . .	CR56	CR63 CR77	
D. Chemical Bonding	5.2a Chemical bonds are formed when valence electrons are. . .			MC09
	3.1dd Compounds can be differentiated by their physical and chemical properties.			MC12
	5.2a Chemical bonds are formed when valence electrons are. . .	MC09		
	5.2b Atoms attain a stable valence electron configuration by bonding with other. . .			MC34
	5.2c When an atom gains one or more electrons, it becomes a negative ion. . .	MC12	MC08 MC35	MC23

	5.2d Electron-dot diagrams (Lewis structures) can represent the valence electron. . .	MC39	MC40	
	5.2e In a multiple covalent bond, more than one pair of electrons are shared. . .	MC10	MC11	
	5.2h Metals tend to react with nonmetals to form ionic compounds. Nonmetals. . .		MC09	MC37
	5.2i When a bond is broken, energy is absorbed.		MC10	MC40
	5.2j Electronegativity indicates how strongly an atom of an element attracts. . .	MC13		MC06
	5.2k The electronegativity difference between two bonded atoms is used to assess. . .		CR62	
	5.2l Molecular polarity can be determined by the shape of the molecule. . .	MC11	CR65	MC11
	5.2n Physical properties of substances can be explained in terms of chemical. . .	CR80	MC41	CR61
E. Physical Beh. Of Matter	3.1jj The structure and arrangement of particles and their interactions determine. . .	MC38		
	3.1kk The three phases of matter (solids, liquids, and gases) have different properties.		CR69	MC41
	3.1ooA solution is a homogeneous mixture of a solute dissolved in a solvent. . .	MC15 MC40	MC14 MC45 CR64	CR57 CR70
	3.1ppThe concentration of a solution may be expressed in molarity (M), percent. . .	MC16	MC13	CR71
	3.1qqThe addition of a nonvolatile solute to a solvent causes the boiling point. . .	CR64		MC44
	3.1r A pure substance (element or compound) has a constant. . .	MC37 CR58		MC39
	3.1u Elements are substances that are composed of atoms that have the same. . .	MC14	MC03	MC15

	3.2a A physical change results in the rearrangement of existing particles in a substance.			MC13
	3.4a The concept of an ideal gas is a model to explain the behavior of gases. . .			MC20
	3.4c Kinetic molecular theory describes the relationships of pressure, volume. . .			MC43
	3.4e Equal volumes of gases at the same temperature and pressure contain. . .			MC19
	4.1b Chemical and physical changes can be exothermic or endothermic.	MC19 CR59		MC17
	4.2a Heat is a transfer of energy (usually thermal energy) from a body. . .	CR57		MC38
	4.2b Temperature is a measurement of the average kinetic energy of the particles. . .	MC41	MC12	MC16
	4.2c The concepts of kinetic and potential energy can be used to explain physical. . .		CR57	MC18 CR53 CR58
	5.2m Intermolecular forces created by the unequal distribution of charge result in varying. . .	CR66		MC14
F. Kinetics/Equilibrium	3.1II Entropy is a measure of the randomness or disorder of a system.			MC45
	3.1mm Systems in nature tend to undergo changes toward lower energy. . .			MC22
	3.4d Collision theory states that a reaction is most likely to occur if reactant particles. . .		CR54	CR64
	3.4f The rate of a chemical reaction depends on several factors: temperature. . .	CR63	MC16 MC44	MC46
	3.4g A catalyst provides an alternate reaction pathway, which has a lower activation. . .		MC17	MC21

	3.4i At equilibrium the rate of the forward reaction equals the rate of the reverse. . .	MC21	MC15	CR62
	3.4j LeChatelier's principle can be used to predict the effect of stress (change. . .	CR60		CR63
	4.1c Energy released or absorbed during a chemical reaction can be. . .		CR70	
	4.1d Energy absorbed during a chemical reaction (heat of reaction) is equal. . .	MC18	MC18 CR71	
G. Organic Chemistry	3.1ff Organic compounds contain carbon atoms, which bond to one another. . .	CR62	CR82	MC10
	3.1gg Hydrocarbons are compounds that contain only carbon and hydrogen. . .	MC17 MC20		MC47 CR60
	3.1hh Organic acids, alcohols, esters, aldehydes, ketones, ethers, halides. . .	MC43 MC45 CR71	MC46	MC24 CR59
	3.1ii Isomers of organic compounds have the same molecular formula. . .	MC22	MC20	MC25
	3.2c Types of organic reactions include addition, substitution, polymerization. . .	CR61	CR78	
	5.2e In a multiple covalent bond, more than one pair of electrons are shared. . .		MC21	
H. Oxidation-Reduction	3.1tt On the pH scale, each decrease of one unit of pH represents a tenfold increase. . .			CR69
	3.2d An oxidation-reduction (redox) reaction involves the transfer of electrons (e-).		MC23	
	3.2e Reduction is the gain of electrons.		MC22	MC26
	3.2f A half-reaction can be written to represent reduction.	CR79		
	3.2i Oxidation numbers (states) can be assigned to atoms and ions. . .	CR78	CR60	CR75

	3.2j An electrochemical cell can be either voltaic or electrolytic. . .	MC24		
	3.2k A voltaic cell spontaneously converts chemical energy to electrical energy.	CR52 CR81	MC24	
	3.3b In a redox reaction the number of electrons lost is equal to the number of electrons gained.	MC23	MC47	
I. Acids, Bases and Salts	3.1rr An electrolyte is a substance which, when dissolved in water, forms a solution. . .			MC48
	3.1ss The acidity or alkalinity of an aqueous solution can be measured by its pH value.	CR74		CR68
	3.1uu Behavior of many acids and bases can be explained by the Arrhenius theory. . .	MC25 MC48		
	3.1vv Arrhenius acids yield $H^+(aq)$, hydrogen ion as the only positive ion. . .		MC48	MC27
	3.1ww Arrhenius bases yield $OH^-(aq)$, hydroxide ion as the only negative ion. . .	MC26	MC25	
	3.1xx In the process of neutralization, an Arrhenius acid and an Arrhenius base. . .	MC47	CR68	CR51
	3.1yy There are alternate acid-base theories. One theory states that an acid is an H^+. . .		MC26	MC49
	3.1zz Titration is a laboratory process in which a volume of a solution of known. . .			CR52
J. Nuclear Chemistry	3.1o Stability of an isotope is based on the ratio of neutrons and protons. . .	MC27		
	3.1p Spontaneous decay can involve the release of alpha particles, beta particles. . .	MC30	MC28	MC29
	4.4a Each radioactive isotope has a specific mode and rate of decay (half-life).	MC49	MC27 CR81	MC50 CR78
	4.4b Nuclear reactions include natural and artificial transmutation, fission, and fusion.		MC29 CR80	

4.4c Nuclear reactions can be represented by equations that include symbols. . .	MC28	CR61	CR77
4.4d Radioactive isotopes have many beneficial uses. Radioactive isotopes are. . .		MC50	
4.4f There are benefits and risks associated with fission and fusion reactions.			MC30
5.3a A change in the nucleus of an atom that converts it from one element. . .	MC29		MC28
5.3b Energy released in a nuclear reaction (fission or fusion) comes from. . .		MC30	

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