



Massachusetts Comprehensive Assessment System Chemistry Formula and Constants Sheet

Common Polyatomic Ions

Ion	Ionic Formula
Ammonium	NH_4^+
Carbonate	CO_3^{2-}
Hydroxide	OH^-
Nitrate	NO_3^-
Phosphate	PO_4^{3-}
Sulfate	SO_4^{2-}

Ideal Gas Law: $PV = nRT$

Absolute Temperature Conversion: $K = ^\circ\text{C} + 273$

Definition of pH: $\text{pH} = -\log [\text{H}_3\text{O}^+]$

Specific Heat of Water: $c_{\text{H}_2\text{O}} = 1.00 \text{ cal/g}\cdot^\circ\text{C} = 4.18 \text{ J/g}\cdot^\circ\text{C}$

Mole-Volume of Ideal Gas at STP: 22.4 L at STP

Ideal Gas Constant: $R = 0.0821 \text{ L}\cdot\text{atm/mol}\cdot\text{K} = 8.314 \text{ L}\cdot\text{kPa/mol}\cdot\text{K}$

Avogadro's number: 6.02×10^{23}

STP: 1 atm, 0°C

Nuclear Particles

Name	Symbol
Alpha particle	α or ${}^4_2\text{He}$
Beta particle	β or ${}^0_{-1}e$
Neutron	1_0n



Massachusetts Comprehensive Assessment System

Periodic Table of the Elements

		Group (Family)																			
		1A											8A								
		1											18								
		1.00794											4.00260								
		H											He								
		1											2								
		Hydrogen											Helium								
		1											13	14	15	16	17	18			
		6.941	9.01218											10.81	12.0111	14.0067	15.9994	18.998403	20.179		
		2	3	4											5	6	7	8	9	10	
		Li	Be											B	C	N	O	F	Ne		
		Lithium	Beryllium											Boron	Carbon	Nitrogen	Oxygen	Fluorine	Neon		
		22.98977	24.305											26.98154	28.0855	30.97376	32.06	35.453	39.948		
		3	11	12	3B	4B	5B	6B	7B	8B			1B	2B	13	14	15	16	17	18	
		Na	Mg	3	4	5	6	7	8			9	10	11	12	Aluminum	Silicon	Phosphorus	Sulfur	Chlorine	Argon
		39.0983	40.08	44.9559	47.88	50.9415	51.996	54.9380	55.847	58.9332	58.69	63.546	65.39	69.72	72.59	74.9216	78.96	79.904	83.80		
		4	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	
		K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr		
		Potassium	Calcium	Scandium	Titanium	Vanadium	Chromium	Manganese	Iron	Cobalt	Nickel	Copper	Zinc	Gallium	Germanium	Arsenic	Selenium	Bromine	Krypton		
		85.4678	87.62	88.9059	91.224	92.9064	95.94	(98)	101.07	102.906	106.42	107.868	112.41	114.82	118.71	121.75	127.60	126.905	131.29		
		5	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	
		Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe		
		Rubidium	Strontium	Yttrium	Zirconium	Niobium	Molybdenum	Technetium	Ruthenium	Rhodium	Palladium	Silver	Cadmium	Indium	Tin	Antimony	Tellurium	Iodine	Xenon		
		132.905	137.33	138.906	178.49	180.948	183.85	186.207	190.2	192.22	195.08	196.967	200.59	204.383	207.2	208.980	(209)	(210)	(211)	(222)	
		6	55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	
		Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn		
		Cesium	Barium	Lanthanum	Hafnium	Tantalum	Tungsten	Rhenium	Osmium	Iridium	Platinum	Gold	Mercury	Thallium	Lead	Bismuth	Polonium	Astatine	Radon		
		(223)	226.025	227.028	(261)	(262)	(263)	(262)	(265)	(266?)	(269?)										
		7	87	88	89	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	
		Fr	Ra	Ac	Rf*	Db	Sg	Bh	Hs	Mt											
		Francium	Radium	Actinium	Rutherfordium	Dubnium	Seaborgium	Bohrium	Hassium	Meitnerium											

Mass numbers in parentheses are those of the most stable or most common isotope.

Lanthanide Series

Actinide Series

140.12	140.908	144.24	(145)	150.36	151.96	157.25	158.925	162.50	164.930	167.26	168.934	173.04	174.967
Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
58	59	60	61	62	63	64	65	66	67	68	69	70	71
Cerium	Praseodymium	Neodymium	Promethium	Samarium	Europium	Gadolinium	Terbium	Dysprosium	Holmium	Erbium	Thulium	Ytterbium	Lutetium
232.038	231.036	238.029	237.048	(244)	(243)	(247)	(247)	(251)	(252)	(257)	(258)	(259)	(260)
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr
90	91	92	93	94	95	96	97	98	99	100	101	102	103
Thorium	Protactinium	Uranium	Neptunium	Plutonium	Americium	Curium	Berkelium	Californium	Einsteinium	Fermium	Mendelevium	Nobelium	Lawrencium