Water and Wastewater Engineering				
Common Elements, Radicals and Compounds				
Substance	**Formula**	**Atomic or Molecular Weight (grams)**	**Common Valence or Electrical Charge**	**Equivalent Weight (grams/equivalent)**
Aluminum	Al^{+3}	27	3	9
Aluminum sulfate	$Al_2(SO_4)_3$* 14.3H_2O	600	6	100
Aluminum hydroxide	$Al(OH)_3$	78	3	26
Aluminum oxide	Al_2O_3	101.9	6	17
Ammonia	NH_3	17		
Ammonium	NH_4^{+1}	18	1	18
Ammonium fluosilicate	$(NH_4)_2SiF_6$	178	2	89
Ammonium sulfate	$(NH_4)_2SO_4$	132	2	66
Arsenic	As^{+3}	74.9	3	25
Barium	Ba^{+2}	137.3	2	68.7
Barium sulfate	$BaSO_4$	233.4	2	116.7
Bicarbonate	HCO_3^{-1}	61	-1	61
Bisulfate	HSO_4^{-1}	97	-1	97
Bisulfite	HSO_3^{-1}	81	-1	81
Boron	B^{+3}	10.8	3	3.6
Bromide	Br^{-1}	79.9	-1	79.9
Bromine	Br_2	159.8	2	79.9
Cadmium	Cd^{+2}	112.4	2	56.2
Calcium	Ca^{+2}	40.1	2	20
Calcium bicarbonate	$Ca(HCO_3)_2$	162	2	81
Calcium carbonate	$CaCO_3$	100	2	50
Calcium chloride	$CaCl_2$	111	2	55
Calcium fluoride	CaF_2	78.1	2	39
Calcium hydroxide	$Ca(OH)_2$	74.1	2	37
Calcium hypochlorite	Ca(ClO)2* 2H_2O	179	2	89.5
Calcium oxide	CaO	56.1	2	28
Calcium phosphate	$Ca_3(PO_4)_2$	310.3	6	51.7
Calcium sulfate	$CaSO_4$	136	2	68
Carbon	C	12	4	3
Carbonate	CO_3^{-2}	60	-2	30
Carbon dioxide	CO_2	44	2	22
Chloride	Cl^-	35.5	-1	35.5
Chlorine	Cl_2	71	2	35.5
Chlorine dioxide	ClO_2	67		

Chromate	CrO_{4-2}	116	-2	58
Chromium	Cr_{+3}	52	3	17.3
Copper	Cu_{+2}	63.5	2	31.8
Copper sulfate	$CuSO_4$	160	2	80
Ferric chloride	$FeCl_3$	162	3	54.1
Ferric hydroxide	$Fe(OH)_3$	107	3	35.6
Ferric sulfate	$Fe_2(SO_4)_3$	400	6	66.7
Ferrous sulfate	$FeSO_4$* $7H_2O$	278	2	139
Fluoride	F_{-1}	19	-1	19
Fluorine	F_2	38	2	19
Hydrochloric acid	HCl	36.5	1	36.5
Hydrogen	H_{+1}	1	1	1
Hydroxide	OH_{-1}	17	-1	17
Hypochlorite	OCl_{-1}	51.5	-1	51.5
Iodide	I_{-1}	126.9	-1	126.9
Iodine	I2	253.8		
Iron (Ferrous)	Fe_{+2}	55.8	2	27.9
Iron (Ferric)	Fe_{+3}	55.8	3	18.6
Lead	Pb_{+2}	207.2	2	103.6
Magnesium	Mg_{+2}	24.3	2	12.2
Magnesium bicarbonate	$Mg(HCO_3)_2$	146.3	2	73.2
Magnesium carbonate	$MgCO_3$	84.3	2	42.1
Magnesium hydroxide	$Mg(OH)_2$	58.3	2	29.2
Magnesium sulfate	$MgSO_4$	120.3	2	60.1
Manganese (Manganous)	Mn_{+2}	54.9	2	27.5
Manganese (Manganic)	Mn_{+4}	54.9	4	13.7
Mercury	Hg_{+2}	200.6	2	100.3
Nickel	Ni_{+2}	58.7	2	29.4
Nitrate	NO_{3-1}	62	-1	62
Nitrite	NO_2-1	46	-1	46
Nitrogen	N_{+3}	14	3	4.7
Nitrogen	N_{-3}	14	-3	4.7
Nitrogen	N_{+5}	14	5	2.8
Orthophosphate	PO_{4-3}	95	-3	31.7
Orthophosphate (mono-hydrogen)	HPO_{4-2}	96	-2	48
Orthophosphate (di-hydrogen)	H_2PO_{4-1}	97	-1	97
Oxygen	O_{-2}	16	-2	8
Phosphate	see	orthophosphate		
Phosphorus	P_{+5}	31	5	6.2
Potassium	K_{+1}	39.1	1	39.1

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Potassium iodide	KI	166	1	166
Potassium permanganate	$KMnO_4$	158	1	158
Selenium	Se_{+6}	79	6	13.1
Silica	SiO_2	60.1	1	60.1
Silicate	H_3SiO_4	95.1	-1	95.1
Silicon	Si_{+4}	28.1	4	6.5
Silver	Ag_{+1}	107.9	1	107.9
Silver chloride	AgCl	143.3	1	143.3
Silver nitrate	$AgNO_3$	169.9	1	169.9
Sodium	Na_{+1}	23	1	23
Sodium aluminate	$NaAlO_2$	82	1	82
Sodium bicarbonate	$NaHCO_3$	84	1	84
Sodium carbonate	Na_2CO_3	106	2	53
Sodium chloride	NaCl	58.4	1	58.4
Sodium fluoride	NaF		42	
Sodium fluosilicate	Na_2SiF_6	188	2	94
Sodium hydroxide	NaOH	40	1	40
Sodium hypochlorite	NaClO	74.4	1	74.4
Sodium nitrate	$NaNO_3$	85	1	85
Sodium silicate	Na_4SiO_4	184	4	46
Sodium sulfate	Na_2SO_4	142	2	71
Sodium thiosulfate	$Na_2S_2O_3$	158	2	79
Strontium	Sr_{+2}	87.6	2	43.8
Sulfate	SO_{4-2}	96	-2	48
Sulfide	S_{-2}	32.1	-2	16
Sulfite	SO_{3-2}	80	-2	40
Sulfur	S_{-2}	32.1	-2	16
Sulfur	S_{+4}	32.1	4	8
Sulfur	S_{+6}	32.1	6	5.3
Sulfur dioxide	SO_2		64.1	
Sulfuric acid	H_2SO_4	98.1	2	49
Water	H_2O		18	
Zinc	Zn_{+2}	65.4	2	32.7

Equivalent weight (combining weight) = atomic weight/ valence (molecular weight/ electrical charge)

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