

## AP CHEMISTRY SECOND DAY TEST

AP Chemistry is a difficult course. It is not all about memorization; however, having these items memorized is essential for success in learning the concepts covered in the course. Make flashcards, have your friends and family quiz you, take the lists with you on vacation, or do whatever it takes to get this information firmly planted in your head. Do not wait until the night before school begins. The test will cover six areas of memorization:

1. Polyatomic Ions (including name, symbol and charge)
2. Variable Valences for Transition Metals
3. Rules for Naming Acids
4. Rules for Naming Ionic Compounds
5. Solubility Rules
6. Determining Oxidation Numbers

Advanced Placement Chemistry is a college level course. You will need to be dedicated and work very hard if you are to be successful.

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### Rules for Naming an Acid

When the name of the anion ends in  $-ide$ , the acid name begins with the prefix  $hydro-$ , the stem of the anion has the suffix  $-ic$  and it is followed by the word acid.

$-ide$  becomes  $hydro$  \_\_\_\_\_  $ic$  Acid  
 $Cl^-$  is the Chloride ion so  $HCl = hydrochloric$  acid

When the anion name ends in  $-ite$ , the acid name is the stem of the anion with the suffix  $-ous$ , followed by the word acid.

$-ite$  becomes \_\_\_\_\_  $ous$  Acid  
 $ClO_2^-$  is the Chlorite ion so  $HClO_2 = Chlorous$  acid.

When the anion name ends in  $-ate$ , the acid name is the stem of the anion with the suffix  $-ic$ , followed by the word acid.

$-ate$  becomes \_\_\_\_\_  $ic$  Acid  
 $ClO_3^-$  is the Chlorate ion so  $HClO_3 = Chloric$  acid.

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### Rules for Naming Ionic Compounds

- 1. Balance Charges (charges should equal zero)**
  - 2. Cation is always written first (in name and in formula)**
  - 3. Change the ending of the anion to  $-ide$**
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## Solubility Rules

1. All compounds containing alkali metal cations and the ammonium ion are soluble.
2. All compounds containing  $\text{NO}_3^-$ ,  $\text{ClO}_4^-$ ,  $\text{ClO}_3^-$ , and  $\text{C}_2\text{H}_3\text{O}_2^-$  anions are soluble.
3. All chlorides, bromides, and iodides are soluble except those containing  $\text{Ag}^+$ ,  $\text{Pb}^{2+}$ , or  $\text{Hg}^{2+}$ .
4. All sulfates are soluble except those containing  $\text{Hg}^{2+}$ ,  $\text{Pb}^{2+}$ ,  $\text{Sr}^{2+}$ ,  $\text{Ca}^{2+}$ , or  $\text{Ba}^{2+}$ .
5. All hydroxides are insoluble except compounds of the alkali metals,  $\text{Ca}^{2+}$ ,  $\text{Sr}^{2+}$ , and  $\text{Ba}^{2+}$ .
6. All compounds containing  $\text{PO}_4^{3-}$ ,  $\text{S}^{2-}$ ,  $\text{CO}_3^{2-}$ , and  $\text{SO}_3^{2-}$  ions are insoluble except those that also contain alkali metals or  $\text{NH}_4^+$ .

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## Rules for Determining Oxidation Number

**Oxidation Number:** A number assigned to an atom in a molecular compound or molecular ion that indicates the general distribution of electrons among the bonded atoms.

1. The oxidation number of any uncombined element is 0.
2. The oxidation number of a monatomic ion equal the charge on the ion.
3. The more electronegative element in a binary compound is assigned the number equal to the charge it would have if it were an ion.
4. The oxidation number of fluorine in a compound is always  $-1$
5. Oxygen has an oxidation number of  $-2$  unless it is combined with F, when it is  $+2$ , or it is in a peroxide, when it is  $-1$ .
6. The oxidation state of hydrogen in most of its compounds is  $+1$  unless it combined with a metal, in which case it is  $-1$ .
7. In compounds, the elements of groups 1 and 2 as well as aluminum have oxidation number of  $+1$ ,  $+2$ , and  $+3$ , respectively
8. The sum of the oxidation numbers of all atoms in a neutral compound is 0.
9. The sum of the oxidation number of all atoms in a polyatomic ion equals the charge of the ion.

### VARIABLE VALENCES FOR TRANSITION METALS

Name	Symbol	Charge	Stock Name	-ous/-ic
Chromium	Cr	+2	Chromium (II)	Chromous
		+3	Chromium (III)	Chromic
Manganese	Mn	+2	Manganese (II)	Manganous
		+3	Manganese	Manganic

			(III)	
Iron	Fe	+2	Iron (II)	Ferrous
		+3	Iron (III)	Ferric
Cobalt	Co	+2	Cobalt (II)	Cobaltous
		+3	Cobalt (III)	Cobaltic
Copper	Cu	+1	Copper (I)	Cuprous
		+2	Copper (II)	Cupric
Lead	Pb	+2	Lead (II)	Plumbous
		+4	Lead (IV)	Plumbic
Mercury	Hg	+1	Mercury (I)	Mercurous
		+2	Mercury (II)	Mercuric
Tin	Sn	+2	Tin (II)	Stannous
		+4	Tin (IV)	Stannic
Gold	Au	+1	Gold (I)	Aurous
		+3	Gold (III)	Auric
Silver	Ag	+1	Silver	Argentous
		+2(rarely)	Silver (II)	Argentific
Bismuth	Bi	+3	Bismuth (III)	Bismuthous
		+5	Bismuth (V)	Bismuthic
Antimony	Sb	+3	Antimony (III)	Stibnous
		+5	Antimony (V)	Stibnic
Cadmium	Cd	+2	Cadmium	
Zinc	Zn	+2	Zinc	

## POLYATOMIC IONS

Name	Symbol	Charge
ammonium	NH <sub>4</sub>	+1
acetate	C <sub>2</sub> H <sub>3</sub> O <sub>2</sub>	-1
bromate	BrO <sub>3</sub>	-1
chlorate	ClO <sub>3</sub>	-1
chlorite	ClO <sub>2</sub>	-1
cyanide	CN	-1
dihydrogen phosphate	H <sub>2</sub> PO <sub>4</sub>	-1
hypochlorite	ClO	-1
hydrogencarbonate(bicarbonate)	HCO <sub>3</sub>	-1
hydrogen sulfate (bisulfate)	HSO <sub>4</sub>	-1
hydrogen sulfite (bisulfite)	HSO <sub>3</sub>	-1
hydroxide	OH	-1
iodate	IO <sub>3</sub>	-1
nitrate	NO <sub>3</sub>	-1
nitrite	NO <sub>2</sub>	-1
perchlorate	ClO <sub>4</sub>	-1
permanganate	MnO <sub>4</sub>	-1
thiocyanate	SCN	-1
carbonate	CO <sub>3</sub>	-2
chromate	CrO <sub>4</sub>	-2
dichromate	Cr <sub>2</sub> O <sub>7</sub>	-2
oxalate	C <sub>2</sub> O <sub>4</sub>	-2
selenate	SeO <sub>4</sub>	-2
silicate	SiO <sub>3</sub>	-2
sulfate	SO <sub>4</sub>	-2
sulfite	SO <sub>3</sub>	-2
phosphate	PO <sub>4</sub>	-3
phosphite	PO <sub>3</sub>	-3

If you need practice writing formulas, use some of the following.

- <http://www.chem.vt.edu/RVGS/ACT/notes/Nomenclature.html>
- <http://chemistry2.csudh.edu/newlehelp/namingcs.html> (Formulas to names.)
- <http://chemistry2.csudh.edu/homework/hwnaming.html> (Formulas to names.)
- <http://proton.csudh.edu/homeworkcs/hwstocknamingcsn7.html>  
(Don't forget to use Roman numerals when using the Stock System.)
- <http://proton.csudh.edu/homeworkcs/hwnamestoformulascsn7.html> (Names to formulas)
- <http://bellsouthpwp.net/m/i/mitchellscience/apchemistry/summer2005test.pdf>

Try some of the following (or review the pages you had in chemistry I.)

CHEMICAL FORMULAS (1)

- |                             |                           |
|-----------------------------|---------------------------|
| 1. Hydrogen bromide         | 27. Lithium nitrate       |
| 2. Lithium iodide           | 28. Aluminum chloride     |
| 3. Potassium chloride       | 29. boron fluoride        |
| 4. Sodium fluoride          | 30. Sodium nitrate        |
| 5. Water                    | 31. Magnesium hydroxide   |
| 6. Ammonium dichromate      | 32. Iron(II) oxide        |
| 7. Copper(II) perchlorate   | 33. Iron(II) chloride     |
| 8. Strontium bromide        | 34. Iron(II) nitrate      |
| 9. Calcium oxide            | 35. iron(III) nitrate     |
| 10. Magnesium sulfide       | 36. Lead(II) nitrate      |
| 11. Barium iodide           | 37. Magnesium phosphate   |
| 12. Strontium chloride      | 38. Chromium(III) acetate |
| 13. Magnesium chloride      | 39. Gold(III) chloride    |
| 14. Barium acetate          | 40. Copper(II) sulfate    |
| 15. Potassium permanganate  | 41. Antimony trichloride  |
| 16. Sodium hydrogen sulfate | 42. Aluminum sulfide      |
| 17. Potassium phosphate     | 43. Lead(II) bromide      |
| 18. Barium nitrate          | 44. Ammonium phosphate    |

19. Potassium bromide

20. Sodium oxide

21. Magnesium sulfate

22. Potassium carbonate

23. Calcium sulfate

24. Barium chlorate

25. Cadmium iodide

45. Potassium chromate

46. Calcium chlorate

47. Potassium hydrogen sulfate

48. Cadmium sulfate

49. Zinc oxide

50. Iron(III) oxide

51. Silver nitrate

52. Sodium chlorate

#### CHEMICAL FORMULAS (2)

53. Copper(I) oxide

54. Sulfuric acid

55. Silver chloride

56. Hydrogen chloride

57. Zinc chloride

58. Manganese(IV) oxide

59. Tetraphosphorus decoxide

60. Calcium hydroxide

61. Sodium chloride

62. Ammonia

63. Cobalt(II) carbonate

64. Lead(II) phosphate

65. Potassium hydride

66. Sodium sulfide

67. Potassium sulfide

68. Lithium sulfide

69. Sodium permanganate

70. Carbon dioxide

79. Silver bromide

80. Potassium chlorate

81. Potassium sulfide

82. Chromium(III) chloride

83. Barium sulfate

84. Aluminum oxide

85. Chromium(II) sulfide

86. Zinc carbonate

87. Barium nitride

88. Lithium carbonate

89. Zinc nitrate

90. Sodium chlorate

91. Phosphorus pentachloride

92. Sodium cyanide

93. Nickel(II) cyanide

94. Lead(II) cyanide

95. Mercury(II) cyanide

96. Nickel(II) carbonate

71. Sulfur dioxide

72. Sulfur hexafluoride

73. Bismuth(III) iodide

74. Calcium hydride

75. Cobalt(II) bromide

76. Calcium sulfide

77. Aluminum nitrate

78. Sodium hydroxide

97. Aluminum hydroxide

98. Sodium sulfate

99. Carbon disulfide

100. Carbon tetrachloride

101. Aluminum chlorite

102. Barium sulfide

103. Magnesium nitride

104. Sodium phosphide

105. Nickel(II) hydroxide

106. Nitric acid

#### CHEMICAL FORMULAS (3)

106. Nitric acid

107. Ammonium hydroxide

108. Silicon disulfide

109. Cadmium bromide

110. Potassium iodide

111. Calcium carbonate

112. Cobalt(II) nitrate

113. Calcium sulfate

114. Iron(II) chloride

115. Iron(III) bromide

116. Acetic acid

117. Perchloric acid

118. Mercury(II) iodide

119. Barium hydroxide

120. Ammonium nitrate

121. Copper(II) acetate

122. Dinitrogen trioxide

130. Potassium sulfate

131. Iron(III) sulfate

132. Sodium nitrite

133. Silicon tetrachloride

134. Mercury(II) nitrate

135. Carbon monoxide

136. Phosphorus pentachloride

137. Chromium(III) sulfate

138. Silver phosphate

139. Copper(II) iodide

140. Calcium hydrogen carbonate

141. Barium chloride

142. Arsenic trichloride

143. Potassium hydroxide

144. Calcium nitrate

145. Hydrochloric acid

146. Silver iodide

- 123. Dinitrogen tetroxide
- 124. Silver carbonate
- 125. Barium phosphate
- 126. Phosphoric acid
- 127. Aluminum chlorate
- 128. Iron(III) hydroxide
- 129. Chromium(III) sulfite

- 147. Sodium permanganate
- 148. Dinitrogen oxide
- 149. Dinitrogen pentoxide
- 150. Phosphorus trichloride
- 151. Nitrogen monoxide
- 152. Nitrogen dioxide
- 153. Mercury(I) iodide

#### CHEMICAL FORMULAS (4)

- 154. Aluminum bromide
- 155. Tin(IV) bromide
- 156. Cobalt(II) sulfate
- 157. Cobalt(II) sulfide
- 158. Zinc acetate
- 159. Ammonium carbonate
- 160. Aluminum sulfide
- 161. Copper(I) iodide
- 162. Antimony pentachloride
- 163. Sodium nitrate
- 164. Mercury(I) oxide
- 165. Lithium bromide
- 166. Copper(II) carbonate
- 167. Lead(II) sulfide
- 168. Ammonium sulfide
- 169. Sodium carbonate
- 170. Lead(II) acetate
- 171. Sodium peroxide
- 172. Sodium hydrogen carbonate

- 178. Aluminum sulfate
- 179. Calcium phosphate
- 180. Phosphorus acid
- 181. calcium fluoride
- 182. Sodium phosphate
- 183. Strontium nitrate
- 184. Potassium dichromate
- 185. Zinc sulfate
- 186. Tin(IV) oxide
- 187. Acetic acid
- 188. Strontium oxide
- 189. Calcium sulfide
- 190. Hydrogen sulfide
- 191. Barium dichromate
- 192. Barium nitrate
- 193. Ammonium nitrite
- 194. Cadmium hydroxide
- 195. Potassium cyanide
- 196. Chromium(III) hydroxide

173. Hydrogen peroxide

174. Silver chromate

175. Diarsenic pentasulfide

176. Carbonic acid

177. Lead(IV) oxide

197. Ammonium sulfate

198. Lithium hydride

199. Chromium(III) oxide

200. Silver perchlorate

201. Aluminum dichromate

202. Iron(III) nitrate