Common Elements, Ions, Strong Acids

Name: _____ Date: _____

There will be a quiz on **Monday, September 14, 2020**. For the quiz you will need to know:

- The symbol and name of the elements listed below
- The name, formula, and charge for the ions listed in the tables that follow
- The formulas and names of the seven strong acids

This information is necessary for answering the equation and reaction questions for the AP exam.

Symbols and names of elements with these atomic numbers need to be memorized:

1-38, 42, 47, 48, 50-57, 74, 78-80, 82, 83, 86-88, 90, 92

For the ions, charge, symbol, and name(s) must be memorized:

1. **Monovalent Cations**
    a. All Group 1 ions
    b. ammonium NH_4^{1+}
    c. silver Ag^{1+}
    d. copper (I) Cu^{1+}
    e. gold (I) Au^{1+}
    f. mercury (I) Hg_2^{2+}
2. **Divalent Cations**
    a. All Group 2 ions
    b. zinc Zn^{2+}
    c. cadmium Cd^{2+}
    d. mercury (II) Hg^{2+}
3. **Trivalent Cations**
    a. aluminum Al^{3+}
4. **Positive Ions with Variable Charges**

IUPAC Name		
copper (I) and (II)	Cu^{1+}	Cu^{2+}
gold (I) and gold (III)	Au^{1+}	Au^{3+}
mercury (I) and (II)	Hg_2^{2+}	Hg^{2+}
chromium (II) and (III)	Cr^{2+}	Cr^{3+}
manganese (II) and (III)	Mn^{2+}	Mn^{3+}
iron (II) and iron (III)	Fe^{2+}	Fe^{3+}
cobalt (II) and (III)	Co^{2+}	Co^{3+}
nickel (II) and (III)	Ni^{2+}	Ni^{3+}
tin (II) and tin (IV)	Sn^{2+}	Sn^{4+}
lead (II) and (IV)	Pb^{2+}	Pb^{4+}
cerium (III) and (IV)	Ce^{3+}	Ce^{4+}
arsenic (III) and (V)	As^{3+}	As^{5+}
antimony (III) and (V)	Sb^{3+}	Sb^{5+}
bismuth (III) and (V)	Bi^{3+}	Bi^{5+}

5. Monatomic Anions (-ide suffix)

a. Group 17 ions
b. hydride H^{1-}

c. oxide O^{2-}
d. sulfide S^{2-}
e. sellenide Se^{2-}
f. telluride Te^{2-}

g. nitride N^{3-}
h. phosphide P^{3-}
i. arsenide As^{3-}

j. carbide C^{4-}

6. Polyatomic Ions

a. Polyatomic Anions with Hydrogen

(1) hydrogen carbonate/bicarbonate	HCO_3^{1-}
(2) hydrogen sulfate/bisulfate	HSO_4^{1-}
(3) hydrogen sulfite/bisulfite	HSO_3^{1-}
(4) monohydrogen phosphate	HPO_4^{2-}
(5) dihydrogen phosphate	$H_2PO_4^{1-}$

b. Polyatomic Anions with Sulfur

(1) thiocyanate	SCN^{1-}
(2) thiosulfate	$S_2O_3^{2-}$

c. Monovalent Polyatomic Ions

(1) nitrate	NO_3^{1-}
(2) nitrite	NO_2^{1-}
(3) perchlorate	ClO_4^{1-}
(4) chlorate	ClO_3^{1-}
(5) chlorite	ClO_2^{1-}
(6) hypochlorite	ClO^{1-}
(7) perbromate	BrO_4^{1-}
(8) bromate	BrO_3^{1-}
(9) bromite	BrO_2^{1-}
(10) hypobromite	BrO^{1-}
(11) periodate	IO_4^{1-}
(12) iodate	IO_3^{1-}
(13) iodite	IO_2^{1-}
(14) hypoiodite	IO^{1-}
(15) permanganate	MnO_4^{1-}
(16) acetate	$C_2H_3O_2^{1-}$
(17) hydroxide	OH^{1-}
(18) cyanide	CN^{1-}

d. Divalent Polyatomic Ions

(1) sulfate SO_4^{2-}
(2) sulfite SO_3^{2-}

(3) chromate CrO_4^{2-}
(4) dichromate $Cr_2O_7^{2-}$

(5) carbonate CO_3^{2-}
(6) oxalate $C_2O_4^{2-}$
(7) peroxide O_2^{2-}

e. Trivalent Polyatomic Ions

(1) phosphate PO_4^{3-}
(2) phosphite PO_3^{3-}
(3) arsenate AsO_4^{3-}
(4) arsenite AsO_3^{3-}

7. Seven Strong Acids (memorize formulas and names)

a. HCl Hydrochloric acid
b. HBr Hydrobromic acid
c. HI Hydroiodic acid
d. H_2SO_4 Sulfuric acid
e. HNO_3 Nitric acid
f. $HClO_4$ Perchloric acid
g. $HClO_3$ Chloric acid

Solubility Guidelines in Water– Please Memorize

Compounds containing:

1. NO_3^-, $C_2H_3O_2^-$, HCO_3^-, ClO_3^-, ClO_4^- are all soluble
2. Group 1 ions and NH_4^+ are all soluble
3. Halides are soluble except when bonded to Ag^+, Hg_2^{2+}, Pb^{2+}
4. Sulfates are soluble except when bonded to Sr^{2+}, Ba^{2+}, Hg_2^{2+}, Pb^{2+}
5. Everything else is insoluble.
6. S^{2-}, and OH^- are insoluble except when bonded to Group 1 ions, NH_4^+, Ca^{2+}, Sr^{2+}, Ba^{2+}