Answer Key

IA (1)																	VIIIA (18)
1 **H** 1.0080	IIA (2)											IIIA (13)	IVA (14)	VA (15)	VIA (16)	VIIA (17)	2 **He** 4.0026
3 **Li** 6.9410	4 **Be** 9.0122											5 **B** 10.811	6 **C** 12.011	7 **N** 14.007	8 **O** 15.999	9 **F** 18.998	10 **Ne** 20.179
11 **Na** 22.990	12 **Mg** 24.305	IIIB (3)	IVB (4)	VB (5)	VIB (6)	VIIB (7)	. . . . . . VIIIB . . . . . . (8) (9) (10)			IB (11)	IIB (12)	13 **Al** 26.982	14 **Si** 28.086	15 **P** 30.974	16 **S** 32.066	17 **Cl** 35.453	18 **Ar** 39.948
19 **K** 39.098	20 **Ca** 40.078	21 **Sc** 44.956	22 **Ti** 47.880	23 **V** 50.942	24 **Cr** 51.996	25 **Mn** 54.938	26 **Fe** 55.847	27 **Co** 58.933	28 **Ni** 58.690	29 **Cu** 63.546	30 **Zn** 65.380	31 **Ga** 69.723	32 **Ge** 72.610	33 **As** 74.922	34 **Se** 78.960	35 **Br** 79.904	36 **Kr** 83.800
37 **Rb** 85.468	38 **Sr** 87.620	39 **Y** 88.906	40 **Zr** 91.224	41 **Nb** 92.906	42 **Mo** 95.940	43 **Tc** 98.907	44 **Ru** 101.07	45 **Rh** 102.91	46 **Pd** 106.42	47 **Ag** 107.87	48 **Cd** 112.41	49 **In** 114.82	50 **Sn** 118.71	51 **Sb** 121.75	52 **Te** 127.60	53 **I** 126.90	54 **Xe** 131.29
55 **Cs** 132.91	56 **Ba** 137.33	57 **La** 138.91	72 **Hf** 178.49	73 **Ta** 180.95	74 **W** 183.85	75 **Re** 186.21	76 **Os** 190.20	77 **Ir** 192.22	78 **Pt** 195.09	79 **Au** 196.97	80 **Hg** 200.59	81 **Tl** 204.38	82 **Pb** 207.20	83 **Bi** 208.98	84 **Po** 208.98	85 **At** 209.99	86 **Rn** 222.02
87 **Fr** 223.02	88 **Ra** 226.03	89 **Ac** 227.03	104 **Unq** 261.11	105 **Unp** 262.11	106 **Unh** 263.12	107 **Uns** 262.12											

58 **Ce** 140.12	59 **Pr** 140.91	60 **Nd** 144.24	61 **Pm** 145.91	62 **Sm** 150.36	63 **Eu** 151.97	64 **Gd** 157.25	65 **Tb** 158.93	66 **Dy** 162.50	67 **Ho** 164.93	68 **Er** 167.26	69 **Tm** 168.93	70 **Yb** 173.04	71 **Lu** 174.97
90 **Th** 232.04	91 **Pa** 231.04	92 **U** 238.03	93 **Np** 237.05	94 **Pu** 244.06	95 **Am** 243.06	96 **Cm** 247.07	97 **Bk** 247.07	98 **Cf** 242.06	99 **Es** 252.08	100 **Fm** 257.10	101 **Md** 258.10	102 **No** 259.10	103 **Lr** 260.11

1. (10 points) Complete the following table of compound names and formulas.

Formula	Name
XeF_6	xenon hexafluoride
Ir_2S_3	iridium(III) sulfide
$CuSO_4 \cdot 5H_2O$	copper(II) sulfate pentahydrate
$HIO_{4(aq)}$	periodic acid
$Hg_2(CN)_2$	mercury(I) cyanide
KSCN	potassium thiocyanate
$H_2Se_{(aq)}$	hydroselenic acid
$Al_2(Cr_2O_7)_3$	aluminum dichromate
Br_2O_7	dibromine heptaoxide
$(NH_4)_2HPO_4$	ammonium hydrogen phosphate

2. (2 points) Write a ***balanced chemical equation*** for the complete combustion of methanol, CH_3OH.

$$2\ CH_3OH\ +\ 3\ O_2\ \longrightarrow\ 2\ CO_2\ +\ 4\ H_2O$$

3. (5 points) **SHOW ALL WORK.** A sulfide of an unknown element E has the formula E_4S_7. A 2.500-g sample of the compound contains 1.071 g of S. Identify element E by using the *mole concept* to determine the appropriate quantity.

mass of E = 2.500 g - 1.071 g = 1.429 g

moles of S = (1.071 g) (1 mole / 32.07 g) = 0.0334 mole S

moles of E = (0.0334 mole S) (4 mole E / 7 mole S) = 0.0191 mole E

molar mass of E = (1.429 g) / (0.0191 mole) = 74.8 g/mole

∴ E = As

4. (2 points) Write a *balanced chemical equation* for the production of $Cr_2(CO_3)_3$ by a *neutralization* reaction.

$$3\ H_2CO_3\quad +\quad 2\ Cr(OH)_3\quad \longrightarrow\quad Cr_2(CO_3)_3\quad +\quad 6\ H_2O$$

      acid   base   salt   water

5. (6 points) **SHOW ALL WORK.** Caproic acid is a foul-smelling organic compound containing carbon, hydrogen, and oxygen. The combustion analysis of a 1.250-g sample of caproic acid produced 2.84 g of CO_2 and 1.16 g H_2O. Determine the *empirical formula* of caproic acid. (molar masses: $CO_2 = 44.0$, $H_2O = 18.0$)

(2.84 g CO_2) (1 mole CO_2 / 44.0 g CO_2) (1 mole C / 1 mole CO_2) = 0.0645 mole C

(1.16 g H_2O) (1 mole H_2O / 18.0 g H_2O) (2 mole H / 1 mole H_2O) = 0.129 mole H

mass of C = (0.0645 mole C) (12.01 g/mole) = 0.775 g C

mass of H = (0.129 mole H) (1.008 g/mole) = 0.130 g H

mass of O = 1.250 g - 0.775 g - 0.130 g = 0.345 g O

moles of O = (0.345 g O) (1 mole / 16.00 g) = 0.0216 mole O

$C_{0.0645} H_{0.129} O_{0.0216}$ (divide thru by 0.0216)   = C_3H_6O