Answers to Chapters 3 & 4 Study Questions

1. Rutherford's experiment supported the ideas that atoms contain a small dense center (nucleus) and are mostly empty space.

2.

Nuclear Symbol	Atomic Number	Mass Number	Number of Protons	Number of Electrons	Number of Neutrons	Charge
$^{40}_{18}Ar$	18	40	18	18	22	0
$^{39}_{19}K^{+}$	19	39	19	18	20	+1
$^{36}_{16}S^{2-}$	16	36	16	18	20	-2

3. $^{20}_{10}Ne$ and $^{22}_{10}Ne$

4. a) MG, Group 2, metal, Period 5
   b) MG, Group 17, nonmetal, Period 4
   c) TM, Period 5
   d) MG, Group 15, nonmetal, Period 3
   e) MG, Group 13, metalloid, Period 2
   f) ITM, Period 7
   g) MG, Group 14, metal, Period 5
   h) TM, Period 6

5. Group 1 = alkali metals; Group 2 = alkaline earth metals; Group 17 = halogens; Group 18 = noble gases.

6. a) Elements made of molecules: O_2, N_2, Cl_2, or any other diatomic element.
   b) Compounds made of molecules: CO_2, H_2O, NH_3, or any other covalent compound.
   c) Compounds made of ions: NaCl, $MgSO_4$, or any other ionic compound.

7. a) positive, +1 b) positive, +2 c) negative, –1 d) negative, –2 e) positive, +1

8. a) covalent, dinitrogen oxide or dinitrogen monoxide
   b) ionic, potassium oxide
   c) covalent, phosphorus trichloride
   d) ionic, aluminum phosphate
   e) covalent, hydrochloric acid
   f) ionic, ammonium fluoride
   g) ionic, lead(II) nitrite
   h) covalent, sulfurous acid

9. a) calcium carbonate b) zinc sulfide c) copper(I) hydroxide
   d) magnesium perchlorate

10. a) K_3PO_4 b) $(NH_4)_2SO_4$ c) $Co(OH)_2$ d) FeN

11. a) PI_3 b) N_2O_5 c) $HClO_3$