Unit 4: Atomic Theory & Subatomic Particles

Answers to homework problems not found in text.

Chapter 3

10. The atomic nucleus is found at the center of each atom, containing protons and neutrons. ~~The~~ Most of the mass of an atom is concentrated in the atomic ~~neut~~ nucleus.

11. Protons have a positive charge. Neutrons are neutral and have about the same mass as a proton. Electrons have a negative charge and are located around the atom's nucleus.

12. The proton and electron should attract because they are oppositely charged. The proton and neutron should neither attract or repel because the neutron is not a charged particle.

16. Californium, Cf, 251 amu

18. Atomic ~~weight~~ mass is the sum of all the masses of protons, neutrons, and electrons.

20. $^{1}_{1}H$, $^{2}_{1}H$, $^{3}_{1}H$

answers to homework problems not found in text (continued)

30. a. He → 2 electrons b. Na → 11 electrons
c. Cl → 17 electrons d. O → 8 electrons
e. Mg → 12 electrons f. S → 16 electrons.

32. $^{83}_{35}Br$

34. a. $^{69}_{31}Ga$ b. $^{98}_{42}Mo$ c. $^{99}_{42}Mo$ d. $^{98}_{43}Tc$

36. pair of isotopes: b

Chapter 4

4. nucleon number = mass number = # of protons + # of neutrons

6. $^{8}_{5}B$ (remember, the atomic # determines the element)

8. $^{125}_{53}I$

10. a. $^{62}_{30}Zn$: 30 protons, 32 neutrons

b. $^{241}_{94}Pu$: 94 protons, 147 neutrons

c. $^{99m}_{43}Tc$: 43 protons, 56 neutrons

d. $^{81m}_{36}Kr$: 36 protons, 45 neutrons

12. b. ^{1}H

14. $^{97}_{43}Tc$

answers to homework problems not found in text (continued)

16. 10.8 atomic mass units (amu) or u

Chapter 6: typo!! should be 37-42

38. a. SO_3 formula mass: 80.1 u
molecular mass: 80.1 g/mole

b. $KBrO_3$ formula mass: 167 u
molecular mass: 167 g/mole

c. $K_2Cr_2O_7$ formula mass: 294.1 u
molecular mass: 294.1 g/mole

d. $Fe(NO_3)_3$ formula mass: 241.8 u
molecular mass: 241.8 g/mole

40. a. 4.61 mol $AlCl_3$ (MW of $AlCl_3$ = 133.5 g/mol)
↳ MW = molecular mass)

$$4.61 \text{ mol} \times \frac{133.5 \text{ g}}{\text{mol}} = 615 \text{ g } AlCl_3$$

b. 0.615 mol Cr_2O_3 MW of Cr_2O_3 = 152.0 g/mol

$$0.615 \text{ mol} \times \frac{152.0 \text{ g}}{\text{mol}} = 93.5 \text{ grams } Cr_2O_3$$

c. 0.158 mol IF_5 MW of IF_5 = 221.9 g/mol

$$0.158 \text{ mol } IF_5 \times \frac{221.9 \text{ g}}{\text{mol}} = 35.1 \text{ grams } IF_5$$

answers to homework problems not found in text (continued)

Chapter 6:

42. a. 16.3 g SF_6 (MW of SF_6 = 146 g/mol)

$$16.3\,g \times \frac{1\,mol}{146\,g} = 0.112\,mol\ SF_6$$

b. 25.4 g $Pb(C_2H_3O_2)_2$ (MW = ~~357~~ 325.2 g/mol)

$$25.4\,g \times \frac{1\,mol}{325.2\,g} = 7.81 \times 10^{-2}\,mol\ Pb(C_2H_3O_2)_2$$

c. 35.6 g $FeCl_3$ (MW = 162.3 g/mol)

$$35.6\,g \times \frac{1\,mol}{162.3\,g} = 0.219\,mol\ FeCl_3$$

d. 75.3 g $Co(ClO_3)_2$ (MW = 225.9 g/mol)

$$75.3\,g \times \frac{1\,mol}{225.9\,g} = 0.333\,mol\ Co(ClO_3)_2$$