

# Unit 4: Atomic Theory & Subatomic Particles

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Answers to homework problems not found in text.

## Chapter 3

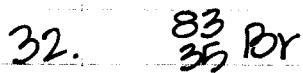
10. The atomic nucleus is found at the center of each atom, containing protons and neutrons. ~~The~~ Most of the mass of an atom is concentrated in the atomic ~~nucle~~ nucleus.
11. Protons have a positive charge. Neutrons are neutral and have about the same mass as a proton. Electrons have a negative 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~~ <sup>mass</sup> is the sum of all the masses of protons, neutrons, and electrons.
20.  ${}^1_1\text{H}$ ,  ${}^2_1\text{H}$ ,  ${}^3_1\text{H}$

# Unit 4

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answers to homework problems not found  
in text (continued)

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



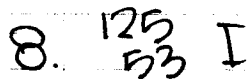
34. a.  ${}_{31}^{69}\text{Ga}$       b.  ${}_{42}^{98}\text{Mo}$       c.  ${}_{42}^{99}\text{Mo}$       d.  ${}_{43}^{98}\text{Tc}$

36. pair of isotopes: b

## Chapter 4

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

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

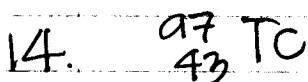


10. a.  ${}_{30}^{62}\text{Zn}$ : 30 protons, 32 neutrons

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

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

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



answers to homework problems  
not found in text (continued)

16. 10.8 atomic mass units or u  
(amu)

Chapter 6 : typo!! should be 37-42

38. a.  $\text{SO}_3$  formula mass : 80.1 u  
molecular mass : 80.1 g/mole

b.  $\text{KBrO}_3$  formula mass : 167 u  
molecular mass : 167 g/mole

c.  $\text{K}_2\text{Cr}_2\text{O}_7$  formula mass : 294.1 u  
molecular mass : 294.1 g/mole

d.  $\text{Fe}(\text{NO}_3)_3$  formula mass : 241.8 u  
molecular mass : 241.8 g/mole

40. a. 4.61 mol  $\text{AlCl}_3$  (MW of  $\text{AlCl}_3 = 133.5 \text{ g/mol}$ )  
(MW = molecular mass)  
$$4.61 \text{ mol} \times \frac{133.5 \text{ g}}{\text{mol}} = 615 \text{ g } \text{AlCl}_3$$

b. 0.615 mol  $\text{Cr}_2\text{O}_3$  MW of  $\text{Cr}_2\text{O}_3 = 152.0 \text{ g/mol}$

$$0.615 \text{ mol} \times \frac{152.0 \text{ g}}{\text{mol}} = 93.5 \text{ grams } \text{Cr}_2\text{O}_3$$

c. 0.158 mol  $\text{IF}_5$  MW of  $\text{IF}_5 = 221.9 \text{ g/mol}$

$$0.158 \text{ mol } \text{IF}_5 \times \frac{221.9 \text{ g}}{\text{mol}} = 35.1 \text{ grams } \text{IF}_5$$

answers to homework problems not found in text (continued)

Chapter 6:

42. a. 16.3 g SF<sub>6</sub> (MW of SF<sub>6</sub> = 146 g/mol)

$$16.3 \text{ g} \times \frac{1 \text{ mol}}{146 \text{ g}} = 0.112 \text{ mol SF}_6$$

b. 25.4 g Pb(C<sub>2</sub>H<sub>3</sub>O<sub>2</sub>)<sub>2</sub> (MW = ~~357~~ 325.2 g/mol)

$$25.4 \text{ g} \times \frac{1 \text{ mol}}{325.2 \text{ g}} = 7.81 \times 10^{-2} \text{ mol Pb(C}_2\text{H}_3\text{O}_2)_2$$

c. 35.6 g FeCl<sub>3</sub> (MW = 162.3 g/mol)

$$35.6 \text{ g} \times \frac{1 \text{ mol}}{162.3 \text{ g}} = 0.219 \text{ mol FeCl}_3$$

d. 75.3 g Co(ClO<sub>3</sub>)<sub>2</sub> (MW = 225.9 g/mol)

$$75.3 \text{ g} \times \frac{1 \text{ mol}}{225.9 \text{ g}} = 0.333 \text{ mol Co(ClO}_3)_2$$