Worksheet for the last session of chemical changes

1. When 56 g of nitrogen react completely with hydrogen, it yields 68 g of ammonia. What quantity of hydrogen has reacted?

Using the Mass Conservation Law, you can write the next equation (56 + x = 68). Clearing "x" in the equation: x = 12 g of hydrogen.

2. Balance the following chemical equations and write the mass of each substance using the periodic table in your book:

a) $S(s) + O_2(g) \rightarrow SO_2(g)$

32 g + 32 g = 64 g

b) $C(s) + \frac{1}{2} O_2(g) \rightarrow CO(g)$ Also: $2C(s) + O_2(g) \rightarrow 2CO(g)$

12 g + 16 g = 28 g 24 g + 32 g = 56 g

c) $2Al(s) + \frac{3}{2} O_2(g) \rightarrow Al_2O_3(s)$ Also: $4Al(s) + 3O_2(g) \rightarrow 2Al_2O_3(s)$

54 g + 48 g = 102 g 108 g + 96 g = 204 g

d) $2Hg(l) + \frac{1}{2} O_2(g) \rightarrow Hg_2O(s)$ Also: $4Hg(s) + O_2(g) \rightarrow 2Hg_2O(s)$

401 g + 16 g = 417 g 802 g + 32 g = 834 g

e) $N_2(g) + \frac{3}{2} O_2(g) \rightarrow N_2O_3(g)$ Also: $2N_2(g) + 3O_2(g) \rightarrow 2N_2O_3(g)$

28 g + 48 g = 76 g 56 g + 96 g = 152 g

3. Complete the table below (I = 127 ; H = 1):

$2HI \rightarrow I_2 + H_2$		
100 g	99,2 g	0,8 g
212,4 g	210,7 g	1,7 g
350 g	347,2 g	2,8 g

The first two examples can be calculated using the Mass Conservation Law. The third example is calculated using the proportion between substances in the previous cases.

4. Marble is made mainly from calcium carbonate ($CaCO_3$) which reacts with acids, for example hydrochloric acid (HCl), and produces calcium chloride ($CaCl_2$), carbon dioxide (CO_2) and water (H_2O).

Data: C = 12 ; O = 16 ; Cl = 35,5 ; H = 1.

a) Which of the substances are the reagents and what are the products?

The reagents are $CaCO_3$ and HCl. The products are $CaCl_2$, CO_2 and H_2O.

b) Write the balanced equation of this chemical reaction.

$CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + CO_2(g) + H_2O(l)$

c) How many grams of water will be obtained when 100 g of calcium carbonate react?

The molecular mass of $CaCO_3$ is 100 g!!

The proportion between the masses of calcium carbonate and water in the equation is 100:18. The answer is 18 g of water.