Balancing Equations

1. Why is the following equation not balanced?

 $N_2 + H_2 \longrightarrow NH_3$

2. The following is an attempt to balance the above equation. What is wrong with the way the equation is balanced?

 $N_2 + H_3 \longrightarrow N_2H_3$

- 3. Balance the following equations.
- a) Na + Cl₂ → Na Cl
- b) $K + O_2 \longrightarrow K_2O$
- c) $H_2 + O_2 \longrightarrow H_2O$
- d) $H_2 + Cl_2 \longrightarrow HCl$
- e) $N_2 + H_2 \longrightarrow NH_3$
- f) CO + O₂ \longrightarrow CO₂
- g) Al + $Br_2 \longrightarrow AlBr_3$
- h) $N_2H_4 + O_2 \longrightarrow H_2O + N_2$

i) $CH_4 + O_2 \longrightarrow CO_2 + H_2O$

4. For each of the following, write the correct skeleton equation, and then balance it to form a chemical equation.

b) lead (II) nitrate + potassium iodide -> lead (II) iodide + potassium nitrate

c) calcium + water \longrightarrow calcium hydroxide + hydrogen gas

d) lead (II) sulfide + oxygen -> lead + sulfur dioxide

e) hydrogen sulfide \longrightarrow hydrogen + sulfur

4. Imagine that you are an engineer trying to determine how much air had to be supplied to burn gasoline in a car engine. Assuming that the gasoline s heptane (C_7H_{16}), the word equation is

heptane + oxygen ---> carbon dioxide + water vapour

- a) Write the skeleton equation for the reaction.
- b) Balance the equation by adding coefficients as necessary.
- c) How many molecules of oxygen are required for every molecule of heptane that burns?

5. Nitrogen oxides are a group of air pollutants produced by internal combustion engines in automobiles. These pollutants are formed by the reaction of atmospheric nitrogen (N_2) and oxygen (O_2) to form various combinations including NO, NO₂, N_2O_4 , N_2O_3 , and N_2O_5 . Write balanced chemical equations to represent the production of each of these substances.