**Activity 5: Balancing Chemical Equations**

***Learning Objectives***

*Balance a simple chemical equation*

**Completion Time** 45 Minutes

**Instructor Information**

This is a first exposure to chemical equations and balancing.

**ANSWERS TO QUESTIONS**

1. a.

|  |  |  |
| --- | --- | --- |
| **Element** | **Number in Reactants** | **Number in Product** |
| Carbon | **1** | **1** |
| Oxygen | **2** | **2** |

b. They are the same.

2. a. No, the equation is not balanced as written.

|  |  |  |
| --- | --- | --- |
| **Element** | **Number in Reactants** | **Number in Product** |
| Hydrogen | **4** | **2** |
| Carbon | **1** | **1** |
| Oxygen | **2** | **3** |

b. CH4(*g*) + 2O2(*g*) → CO2(*g*) + 2H2O(*g*)

c.

|  |  |  |
| --- | --- | --- |
| **Element** | **Number in Reactants** | **Number in Product** |
| Hydrogen | **4** | **4** |
| Carbon | **1** | **1** |
| Oxygen | **4** | **4** |

3. a. 2Fe(*s*) + 3Cl2(*g*) → 2FeCl3(*s*)

b. NaOH(*s*) + CO2(*g*) → NaHCO3(*s*) balanced as given.

c. CaCN2(*s*)+ 3H2O(*l*) → CaCO3(*s*) + 2NH3(*g*)

d. CO(*g*) + 2H2(*g*) → CH3OH(*g*)

e. 2SO2(*g*) + O2(*g*) → 2SO3(*g*)

f. C12H22O11(*s*) → 12C(*s*) + 11H2O(*g*)

**Activity 5: Skill Development**

Balance the following chemical equations

a. 2NaBr(*s*) + CaF2(*s*) → 2NaF(*s*) + CaBr2(*s*)

b. 3Ca(s) + 2ScF3(*s*) → 2Sc(*s*) + 3CaF2(*s*)

c. 2C6H5COOH(*l*) + 17O2(*g*) → 14CO2(*g*) + 6H2O(*l*)

d. 2KMnO4 (s) + 16HCl(aq) → 2KCl(aq) + 2MnCl2(aq) + 8H2O(l) + 5Cl2(g)

e. 2C6H6S2(*l*) + 15O2(*g*) → 12CO(*g*) + 6H2O(*g*) + 4SO3(*g*)

f. 4KO2(*s*) + 2CO2(*g*) → 2K2CO3(*s*) + 3O2 (*g*)