# Transition skills – basic chemistry competencies answer sheet

## Balance the equations below.

|  |  |  |
| --- | --- | --- |
| 1. 2C + …..O2
 |  | 2CO |
| 1. …..Ba + 2H2O
 |  | …..Ba(OH)2 + …..H2 |
| 1. …..C2H6 + 3.5O2
 |  | 2CO2 + 3H2O |
| 1. 2HCl + …..Mg(OH)2
 |  | …..MgCl2 + 2H2O |
| 1. …..N2 + …..O2
 |  | 2NO |
| 1. 2Fe2O3 + …3C
 |  | 4Fe + 3CO2 |
| 1. …..CH3CH2OH + 2[O]
 |  | …..CH3COOH + …..H2O |
| 1. 2HNO3 + …..CuO
 |  | …..Cu(NO3)2 + H2O |
| 1. …..Al3+ + 3e–
 |  | …..Al |
| 1. 2Fe(H2O)63+ + 3CO32–
 |  | 2Fe(OH)3(H2O)3 + 3CO2 + 3H2O |

(10 marks)

# Constructing ionic formula

1. For each of the following ionic salts, determine the cation and anion present and use these to construct the formula of the salt.

(5 marks)

1. Magnesium oxide
2. Sodium sulfate
3. Calcium hydroxide
4. Aluminium oxide
5. Copper(I) oxide

a. Mg2+ O2– = MgO

b. Na+ SO42– = Na2SO4

c. Ca2+ OH– = Ca(OH)2

d. Al3+ O2– = Al2O3

e. Cu+ O2– = Cu2O

1. When an acid is added to water it dissociates to form H+ ions (which make it acidic) and an anion. These acidic hydrogen atoms can be used to determine the charge on the anion.

Deduce the charge on the anions in the following acids. The acidic H atoms, H+, have been underlined for you.

(5 marks)

1. H2SO3
2. HNO3
3. H3PO4
4. HCOOH
5. H2CO3

a. SO42–

b. NO3–

c. PO43–

d. HCOO–

e. CO32–

# Writing equations from text

The following questions contain a written description of a reaction. In some cases the products may be missing as you will be expected to predict the product using your prior knowledge.

For more advanced equations you may be given some of the formula you need.

For each one, write a balanced symbol equation for the process.

1. marks)
2. The reaction between silicon and nitrogen to form silicon nitride Si3N4.

3Si + 2N2 Si3N4

1. The neutralisation of sulfuric acid with sodium hydroxide.

H2SO4 + 2NaOH Na2SO4 + 2H2O

1. The preparation of boron trichloride from its elements.

B + 1.5Cl2 BCl3

1. The reaction of nitrogen and oxygen to form nitrogen monoxide.

N2 + O2 2NO

1. The combustion of ethanol (C2H5OH) to form carbon dioxide and water only.

C2H5OH + 3O2 2CO2 + 3H2O

1. The formation of silicon tetrachloride (SiCl4) from SiO2 using chlorine gas and carbon.

SiO2 + C + 2Cl2 SiCl4 + CO2

1. The extraction of iron from iron(III) oxide (Fe2O3) using carbon monoxide.

Fe2O3 + 3CO 2Fe + 3CO2

1. The complete combustion of methane.

CH4 + 2O2 CO2 + 2H2O

1. The formation of one molecule of ClF3 from chlorine and fluorine molecules.

0.5Cl2 + 1.5F2 ClF3

1. The reaction of nitrogen dioxide with water and oxygen to form nitric acid.

2NO2 + H2O + 0.5O2 2HNO3