

## Transition skills – basic chemistry competencies answer sheet

Balance the equations below.

- $2\text{C} + \dots\text{O}_2 \longrightarrow 2\text{CO}$
- $\dots\text{Ba} + 2\text{H}_2\text{O} \longrightarrow \dots\text{Ba}(\text{OH})_2 + \dots\text{H}_2$
- $\dots\text{C}_2\text{H}_6 + 3.5\text{O}_2 \longrightarrow 2\text{CO}_2 + 3\text{H}_2\text{O}$
- $2\text{HCl} + \dots\text{Mg}(\text{OH})_2 \longrightarrow \dots\text{MgCl}_2 + 2\text{H}_2\text{O}$
- $\dots\text{N}_2 + \dots\text{O}_2 \longrightarrow 2\text{NO}$
- $2\text{Fe}_2\text{O}_3 + \dots 3\text{C} \longrightarrow 4\text{Fe} + 3\text{CO}_2$
- $\dots\text{CH}_3\text{CH}_2\text{OH} + 2[\text{O}] \longrightarrow \dots\text{CH}_3\text{COOH} + \dots\text{H}_2\text{O}$
- $2\text{HNO}_3 + \dots\text{CuO} \longrightarrow \dots\text{Cu}(\text{NO}_3)_2 + \text{H}_2\text{O}$
- $\dots\text{Al}^{3+} + 3\text{e}^- \longrightarrow \dots\text{Al}$
- $2\text{Fe}(\text{H}_2\text{O})_6^{3+} + 3\text{CO}_3^{2-} \longrightarrow 2\text{Fe}(\text{OH})_3(\text{H}_2\text{O})_3 + 3\text{CO}_2 + 3\text{H}_2\text{O}$

(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)

- Magnesium oxide
- Sodium sulfate
- Calcium hydroxide
- Aluminium oxide
- Copper(I) oxide

- $\text{Mg}^{2+} \text{O}^{2-} = \text{MgO}$
- $\text{Na}^+ \text{SO}_4^{2-} = \text{Na}_2\text{SO}_4$
- $\text{Ca}^{2+} \text{OH}^- = \text{Ca}(\text{OH})_2$
- $\text{Al}^{3+} \text{O}^{2-} = \text{Al}_2\text{O}_3$
- $\text{Cu}^+ \text{O}^{2-} = \text{Cu}_2\text{O}$

2. When an acid is added to water it dissociates to form  $\text{H}^+$  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,  $\text{H}^+$ , have been underlined for you.

(5 marks)

- $\underline{\text{H}}_2\text{SO}_3$
- $\underline{\text{H}}\text{NO}_3$
- $\underline{\text{H}}_3\text{PO}_4$
- $\text{H}\underline{\text{C}}\text{OO}\underline{\text{H}}$
- $\underline{\text{H}}_2\text{CO}_3$

- $\text{SO}_4^{2-}$
- $\text{NO}_3^-$
- $\text{PO}_4^{3-}$
- $\text{HCOO}^-$
- $\text{CO}_3^{2-}$

## Writing equations from text

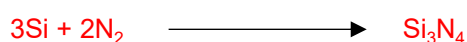
The following questions contain a written description of a reaction. In some cases the products may be missing as you will be expected to predict the product using your prior knowledge.

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.

(10 marks)

1. The reaction between silicon and nitrogen to form silicon nitride  $\text{Si}_3\text{N}_4$ .



2. The neutralisation of sulfuric acid with sodium hydroxide.



3. The preparation of boron trichloride from its elements.



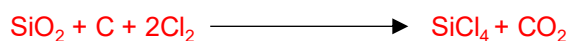
4. The reaction of nitrogen and oxygen to form nitrogen monoxide.



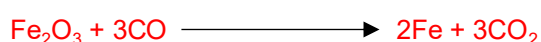
5. The combustion of ethanol ( $\text{C}_2\text{H}_5\text{OH}$ ) to form carbon dioxide and water only.



6. The formation of silicon tetrachloride ( $\text{SiCl}_4$ ) from  $\text{SiO}_2$  using chlorine gas and carbon.



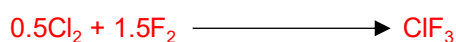
7. The extraction of iron from iron(III) oxide ( $\text{Fe}_2\text{O}_3$ ) using carbon monoxide.



8. The complete combustion of methane.



9. The formation of one molecule of  $\text{ClF}_3$  from chlorine and fluorine molecules.



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

