

Transition skills – basic chemistry competencies question sheet

Balance the equations below.

-C +O₂ →CO
-Ba +H₂O →Ba(OH)₂ +H₂
-C₂H₆ +O₂ →CO₂ +H₂O
-HCl +Mg(OH)₂ →MgCl₂ + H₂O
-N₂ +O₂ →NO
-Fe₂O₃ +C →Fe +CO₂
-CH₃CH₂OH +[O] →CH₃COOH +H₂O
-HNO₃ +CuO →Cu(NO₃)₂ + H₂O
-Al³⁺ +e⁻ →Al
-[Fe(H₂O)₆]³⁺ +CO₃²⁻ →Fe(OH)₃(H₂O)₃ +CO₂ +H₂O

(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)

- a. Magnesium oxide
- b. Sodium sulfate
- c. Calcium hydroxide
- d. Aluminium oxide
- e. Copper(I) oxide

2. 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)

- a. H₂SO₃
- b. HNO₃
- c. H₃PO₄
- d. HCOOH
- e. H₂CO₃

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 Si_3N_4 .

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2. The neutralisation of sulfuric acid with sodium hydroxide.

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3. The preparation of boron trichloride from its elements.

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

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

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6. The formation of silicon tetrachloride (SiCl_4) from SiO_2 using chlorine gas and carbon.

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7. The extraction of iron from iron(III) oxide (Fe_2O_3) using carbon monoxide.

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8. The complete combustion of methane.

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9. The formation of one molecule of ClF_3 from chlorine and fluorine molecules.

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

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