R.1 Chemical Reactions & Equations

Practice Worksheet — name: _____ date: _____

SECTION A — MULTIPLE CHOICE

A1. In the balanced equation $2Mg + O_2 \rightarrow 2MgO$, the 2 in front of Mg means:

- (A) Magnesium has a charge of 2+
- (B) Two atoms of magnesium react for each oxygen molecule
- (C) Magnesium is in Group 2
- (D) The reaction happens twice

A2. 10 g of calcium carbonate is heated in an open crucible and the remaining solid weighs 5.6 g. The "missing" mass:

- (A) Was destroyed by the heat
- (B) Escaped as carbon dioxide gas
- (C) Turned into energy
- (D) Shows the balance was faulty

A3. Zinc displaces copper from copper sulfate solution but not magnesium from magnesium sulfate. This shows the reactivity order is:

- (A) Copper > zinc > magnesium
- (B) Zinc > magnesium > copper
- (C) Magnesium > zinc > copper
- (D) Zinc > copper > magnesium

SECTION B — SHORT ANSWER

B1. Balance the equation: $CH_4 + O_2 \rightarrow CO_2 + H_2O$, and name the reaction type. [3 marks]

B2. Describe how you would test a gas to show it is carbon dioxide. [2 marks]

© NEWTONINE | THE IB PHYSICS LAB — free IB science resources at **www.newtonine.com**

B3. Iron filings are added to blue copper sulfate solution. State two observations and write the word equation. [3 marks]

ANSWER KEY

For worked explanations, interactive practice and more free resources, visit **www.newtonine.com**

Section A

A1: Two atoms of magnesium react for each oxygen molecule — Coefficients count particles taking part; they balance the atoms on each side (2 Mg and 2 O both sides). Subscripts belong to the formula and can never be changed to balance an equation.

A2: Escaped as carbon dioxide gas — Thermal decomposition: $CaCO_3 \rightarrow CaO + CO_2$. Mass is conserved — the 4.4 g of CO_2 simply left the open container. In a sealed system the total mass would be unchanged.

A3: Magnesium > zinc > copper — A metal displaces any metal below it in the reactivity series. Zinc beats copper (displaces it) but loses to magnesium (cannot displace it), placing zinc between the two.

Section B

B1: $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$. Check: 1 C, 4 H, 4 O on each side. This is combustion — a fuel reacting with oxygen, releasing energy.

B2: Bubble the gas through limewater (calcium hydroxide solution). If the limewater turns milky/cloudy, the gas is carbon dioxide — the cloudiness is a precipitate of calcium carbonate.

B3: The blue solution fades (becoming pale green iron sulfate) and a red-brown coating of copper forms on the iron. The mixture may warm slightly. Word equation: iron + copper sulfate → iron sulfate + copper.