

## Single Replacement Reactions Quiz Questions and Answers PDF

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#### Which halogen is most likely to replace another halogen in a compound?

- Iodine
- Bromine
- Chlorine
- Fluorine ✓

The halogen that is most likely to replace another halogen in a compound is fluorine, as it is the most reactive halogen due to its high electronegativity and small atomic size.

#### Which of the following is a single replacement reaction?

- $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
- $\text{NaCl} + \text{AgNO}_3 \rightarrow \text{NaNO}_3 + \text{AgCl}$
- $\text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$  ✓
- $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$

A single replacement reaction occurs when one element replaces another in a compound. This type of reaction can be represented by the general formula  $\text{A} + \text{BC} \rightarrow \text{AC} + \text{B}$ , where A is a single element and BC is a compound.

#### Explain why a single replacement reaction might not occur even if reactants are present.

A single replacement reaction might not occur if the replacing element is less reactive than the element it is trying to replace.

Which of the following elements is most likely to replace hydrogen in a compound?

- Gold (Au)
- Silver (Ag)
- Zinc (Zn) ✓
- Copper (Cu)

Elements that are more reactive than hydrogen, such as alkali metals (e.g., lithium, sodium), are most likely to replace hydrogen in a compound. This is due to their higher reactivity and tendency to form bonds with other elements.

Which of the following reactions are examples of single replacement reactions? (Select all that apply)

- $\text{Cu} + 2\text{AgNO}_3 \rightarrow 2\text{Ag} + \text{Cu}(\text{NO}_3)_2$  ✓
- $2\text{Na} + \text{Cl}_2 \rightarrow 2\text{NaCl}$
- $\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$  ✓
- $\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}$

Single replacement reactions involve one element being replaced by another in a compound. To identify these reactions, look for a pattern where an element reacts with a compound, resulting in a new element and a new compound.

In a single replacement reaction involving halogens, which factors determine if the reaction will occur? (Select all that apply)

- The position of the halogens in the periodic table ✓
- The color of the halogens
- The reactivity of the halogens ✓
- The temperature of the reaction

The occurrence of a single replacement reaction involving halogens is determined by the reactivity of the halogens involved, specifically their positions in the reactivity series. A more reactive halogen can displace a less reactive halogen from its compound.

What are the characteristics of a single replacement reaction? (Select all that apply)

- Involves exchange of ions between two compounds

- Involves a free element and a compound ✓
- Produces a new element and a new compound ✓
- Requires a catalyst to occur

Single replacement reactions involve one element being replaced by another in a compound, typically resulting in the formation of a new element and a new compound. They are characterized by the general form  $A + BC \rightarrow AC + B$ , where A is a more reactive element displacing B from the compound BC.

**Provide an example of a single replacement reaction involving a metal and an acid, and explain the process.**

An example of a single replacement reaction is when zinc (Zn) reacts with hydrochloric acid (HCl) to produce zinc chloride (ZnCl<sub>2</sub>) and hydrogen gas (H<sub>2</sub>). The reaction can be represented as:  $Zn + 2HCl \rightarrow ZnCl_2 + H_2$ .

**Which of the following statements about the activity series are true? (Select all that apply)**

- It ranks metals by their ability to be oxidized. ✓
- It can predict the outcome of double replacement reactions.
- It includes both metals and non-metals. ✓
- It helps determine the feasibility of single replacement reactions. ✓

The activity series is a list of metals ranked by their reactivity, with more reactive metals displacing less reactive ones in chemical reactions. Statements about the activity series that are true typically include that it helps predict the outcomes of single displacement reactions and that it is based on experimental observations of metal reactivity.

**What is the role of the activity series in single replacement reactions?**

- It predicts the color change in reactions.
- It determines the solubility of compounds.
- It ranks elements by reactivity. ✓
- It measures the temperature change in reactions.

The activity series is a list of metals ranked by their reactivity, which helps predict whether a single replacement reaction will occur. A more reactive metal can replace a less reactive metal in a compound, guiding the feasibility of the reaction.

**What is the general form of a single replacement reaction?**

- $AB + C \rightarrow AC + B$
- $A + BC \rightarrow AC + B$  ✓
- $AB + CD \rightarrow AD + CB$
- $A + B \rightarrow AB$

A single replacement reaction involves one element being replaced by another in a compound. The general form can be represented as  $A + BC \rightarrow AC + B$ , where A is a free element and BC is a compound.

**Which of the following metals is least reactive according to the activity series?**

- Lithium (Li)
- Iron (Fe)
- Gold (Au) ✓
- Magnesium (Mg)

In the activity series of metals, gold is considered the least reactive metal. This means it does not easily participate in chemical reactions compared to other metals.

**In the reaction  $Cl_2 + 2KBr \rightarrow 2KCl + Br_2$ , which element is being replaced?**

- Chlorine
- Potassium
- Bromine ✓
- None

In the given reaction, chlorine ( $Cl_2$ ) is replacing bromine (Br) in the compound KBr, resulting in the formation of KCl and bromine gas ( $Br_2$ ). This is an example of a single displacement reaction where one element displaces another in a compound.

**In a single replacement reaction, which type of element typically replaces another in a compound?**

- A less reactive element
- A more reactive element ✓
- An element with a higher atomic number

- An element with a lower atomic number

In a single replacement reaction, a more reactive element typically replaces a less reactive element in a compound. This often involves metals or halogens displacing other metals or halogens, respectively.

**Predict the products of the reaction between magnesium and hydrochloric acid, and explain your reasoning.**

The products of the reaction are magnesium chloride ( $\text{MgCl}_2$ ) and hydrogen gas ( $\text{H}_2$ ).

**Which of the following metals can displace iron from iron(III) oxide in a single replacement reaction? (Select all that apply)**

- Aluminum (Al) ✓
- Copper (Cu)
- Magnesium (Mg) ✓
- Zinc (Zn) ✓

Metals that are more reactive than iron, such as aluminum and zinc, can displace iron from iron(III) oxide in a single replacement reaction. Therefore, the correct answers would include these metals based on their reactivity series.

**Which elements can replace hydrogen in acids during single replacement reactions? (Select all that apply)**

- Sodium (Na) ✓
- Gold (Au)
- Calcium (Ca) ✓
- Silver (Ag)

In single replacement reactions involving acids, metals that are more reactive than hydrogen can replace hydrogen. Common examples include alkali metals and alkaline earth metals such as lithium, sodium, and calcium.

**Discuss the industrial applications of single replacement reactions and their significance.**

Single replacement reactions are widely used in industries for metal extraction processes, such as the extraction of copper from its ores using scrap iron. They are also important in electroplating, where metals are deposited onto surfaces to improve corrosion resistance and aesthetic appeal. Additionally, these reactions play a role in the production of chemicals, such as the synthesis of hydrogen gas from water using reactive metals.

**Describe how the activity series is used to predict the products of a single replacement reaction.**

To predict the products of a single replacement reaction, compare the reactivity of the free element with that of the element in the compound using the activity series; if the free element is more reactive, it will replace the less reactive element in the compound.

**Explain the difference between single replacement reactions and double replacement reactions.**

In a single replacement reaction, an element reacts with a compound and displaces another element from it (e.g.,  $A + BC \rightarrow AC + B$ ). In a double replacement reaction, two compounds exchange ions or elements to form two new compounds (e.g.,  $AB + CD \rightarrow AD + CB$ ).