



# **Chemistry** L0.11

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**Qena Students Club**



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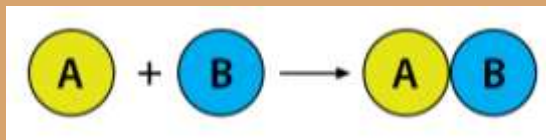
**Double-replacement reaction**

# Synthesis reaction

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- 🔔 **A synthesis reaction** is a type of reaction in which multiple (reactants) combine to form a single (product).
- 🔔 It releases energy in the form of heat or light.
- 🔔 Synthesis reaction is **exothermic**.
- 🔔 It is one of the most common types of chemical reaction.
- 🔔 you have more reactants than products.
- 🔔 The general equation for a synthesis reaction is:



# Synthesis reaction

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⚗ **Synthesis reaction** is the formation of potassium chloride from potassium and chlorine gas : (elements)



⚗ **Synthesis reaction** is the formation of Aluminum oxide from aluminum and oxygen (elements)



⚗ **Synthesis reaction** is the formation of Calcium hydroxide by the action of water on calcium oxide: (compounds)



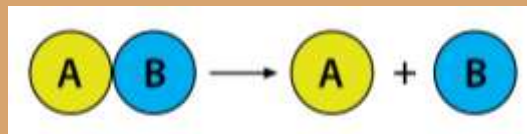
⚗ **Law of Conservation of Mass:** the law that states that the total mass of the products of a chemical reaction is the same as the total mass of the reactants entering into the reaction.

# Decomposition reaction

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- ✦ A decomposition reaction is a reaction in which a compound breaks down into two or more simpler substances.
- ✦ Most decomposition reactions require an input of energy in the form of heat, light, or electricity.
- ✦ synthesis reactions are the reverse of a decomposition reaction.
- ✦ A decomposition reaction can be both endothermic or exothermic.
- ✦ The simplest kind of decomposition reaction is when a binary compound decomposes into its elements.
- ✦ The general equation for a decomposition reaction is:



# Decomposition reaction

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## 🔗 Types of Decomposition Reaction

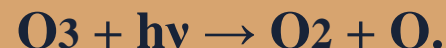
**Thermal decomposition reaction:** Thermal decomposition reactions are endothermic reactions that require heat to break chemical bonds and separate constituent elements, requiring energy to be supplied to the reactants.



**Electrolytic decomposition reaction:** An electrolytic decomposition reaction uses electrical energy as activation energy, like the electrolysis of water, as represented by the chemical equation.



**Photo decomposition reaction:** Photodecomposition is a chemical reaction where reactants absorb energy from photons, like ozone's decomposition into dioxygen and oxygen radical.



# Single-replacement reaction



- Single-replacement reaction is a reaction in which one element is substituted for another element in a compound.
- The starting materials are always pure elements, such as a pure zinc metal or hydrogen gas, plus an aqueous compound. When a replacement reaction occurs, a new aqueous compound and a different pure element will be generated as products.

Single-replacement reaction depends on Chemical activity series:

The general equation for this type of reaction can be written as follows:



How to remember the Reactivity Series?

Please	Potassium	Most reactive
Stop	Sodium	↑
Calling	Calcium	
Me	Magnesium	
A	Aluminium	
Careless	(Carbon)	
Zebra	Zinc	
Instead	Iron	
Try	Tin	
Learning	Lead	
How	(Hydrogen)	
Copper	Copper	
Saves	Silver	
Gold	Gold	
	Least reactive	



# Single-replacement reaction

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⚡ Magnesium is a more reactive metal than copper. The products of the reaction are aqueous magnesium nitrate and solid copper metal



⚡ chlorine reacts with sodium bromide to produce sodium chloride and bromine



⚡ Zinc reacts with hydrochloric acid to produce aqueous zinc chloride and hydrogen



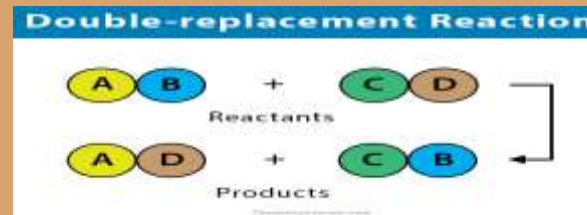


# Double-Replacement Reactions



✦ **Double displacement reactions** occur when a part of two ionic compounds is exchanged and makes two new components.

✦ **The general equation for a double-replacement reaction is:**



## Types of Double Displacement Reactions

- Neutralization Reaction
- Precipitation Reaction
- Gas Formation

# Double-Replacement Reactions

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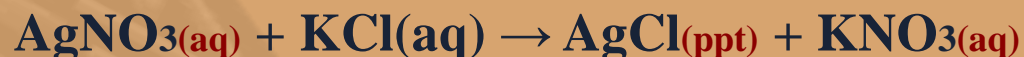


## ✦ Types of Double Displacement Reactions

**Neutralization Reaction:** A neutralization reaction is an acid-base reaction which yields a solution with a neutral pH.



**Precipitation Reaction:** Two compounds react to form a solid product called a precipitate. The precipitate is either slightly soluble or else insoluble in water.



**Gas Formation:** A gas formation reaction is one which yields a gas as a product. The example given earlier, in which hydrogen sulfide was produced, was a gas formation reaction.



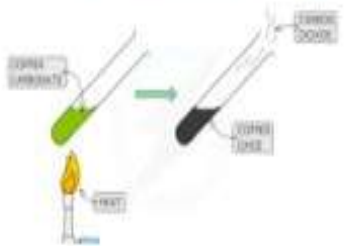
# Types of chemical reaction

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## Decomposition

is a reaction in which a compound breaks down into two or more simpler substances.

Thermal decomposition reaction:



Electrolytic decomposition reaction

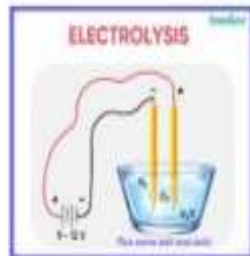
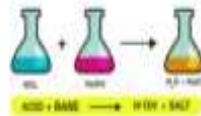


Photo decomposition reaction

## Synthesis

is a type of reaction in which multiple (reactants) combine to form a single (product).



## Double replacement reaction

occur when a part of two ionic compounds is exchanged and makes two new components.

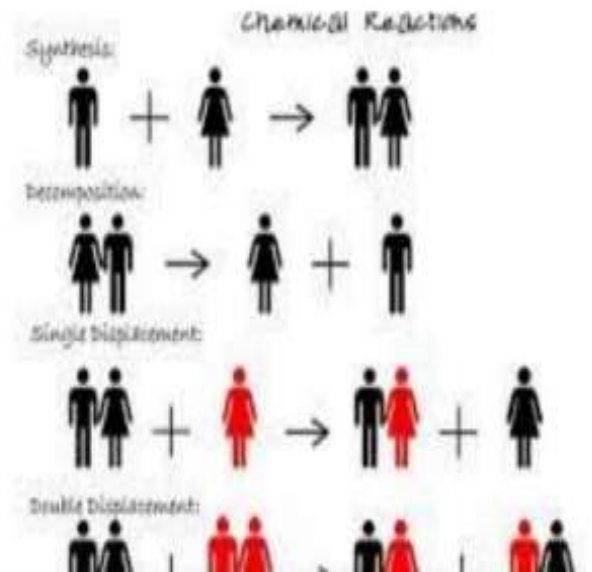
Neutralization Reaction

Precipitation Reaction

Gas Formation

## Single replacement reaction

is a reaction in which one element is substituted for another element in a compound. The starting material

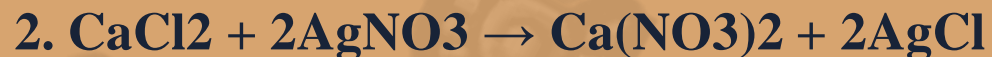


# Test Bank LO 11

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1- Classify each of the following chemical reactions.





4)When  $\text{AgNO}_3$  (aq) is mixed with  $\text{NaCl}$  (aq), which type of reaction will occur?

5)How many atoms of oxygen are represented in  $2 \text{Ca}(\text{NO}_3)_2$ ?

6)Chemical equations must be balanced to satisfy the .....

- a. law of definite proportions
- b. law of multiple proportions
- c. law of conservation of mass
- d. principle of Avogadro

7)Chemical equations describe .....

- a. nuclear reactions
- b. electrochemical processes
- c. chemical reactions
- d. biological reactions
- e. all the above

8)Chemical equation .....

- a. describe chemical reactions.
- b. show how to write chemical formulas.
- c. give directions for naming chemical compounds.
- d. describe only biological changes.



9) When the equation,  $\text{Fe} + \text{Cl}_2 \rightarrow \text{FeCl}_3$ , is balanced, what is the coefficient for  $\text{Cl}_2$ ?

- a. 1
- b. 2
- c. 3
- d. 4

10) Aluminum chloride and bubbles of hydrogen gas are produced when metallic aluminum is placed in hydrochloric acid. What is the balanced equation for this reaction?

- a.  $\text{H} + \text{AlCl} \rightarrow \text{Al} + \text{HCl}$
- b.  $2\text{Al} + 6\text{HCl} \rightarrow 2\text{AlCl}_3 + 3\text{H}_2$
- c.  $\text{Al} + \text{HCl}_3 \rightarrow \text{AlCl}_3 + \text{H}$
- d.  $\text{Al} + 2\text{HCl} \rightarrow \text{AlCl}_2 + \text{H}_2$
- e.  $\text{H}_2 + \text{AlCl}_3 \rightarrow \text{Al} + 2\text{HCl}$

11) In a combustion reaction, one of the reactants is

- a. hydrogen
- b. nitrogen
- c. oxygen
- d. a metal
- e. a binary ionic compound





**12) Which of the following types of chemical reactions is characterized by a substance reacting with oxygen?**

- a. combustion**
- b. neutralization**
- c. decomposition**
- d. electrochemical**
- e. Disproportionation**

**13) Use the reaction equation below to answer the question that follows.  $\text{HCl(aq)} + \text{NaOH(aq)} \rightarrow \text{H}_2\text{O(l)} + \text{X}$  According to the principle of conservation of matter, which of the following is the chemical formula for the reaction product X in the equation shown above?**

- a.  $\text{NaOH(aq)}$**
- b.  $\text{HCl(aq)}$**
- c.  $\text{NaCl(aq)}$**
- d.  $\text{O}_2\text{(g)}$**
- e. Solid substance of sodium**

**14) What is the general form for a single-replacement reaction?**

- a.  $\text{AX} + \text{BY} \rightarrow \text{AY} + \text{BX}$**
- b.  $\text{A} + \text{B} \rightarrow \text{AB}$**
- c.  $\text{AB} \rightarrow \text{A} + \text{B}$**
- d.  $\text{A} + \text{BX} \rightarrow \text{AX} + \text{B}$**





15) What kind of reaction is represented by the equation  $C_2Cl_4 + Cl_2 \rightarrow C_2Cl_6$ ?

- a. synthesis
- b. single replacement
- c. REDOX
- d. Combustion

16) The reaction  $Pb(NO_3)_2(aq) + 2KI(aq) \rightarrow PbI_2(s) + 2KNO_3(aq)$  is a

- a. double-replacement reaction.
- b. decomposition reaction.
- c. synthesis reaction.
- d. combustion reaction

17) Potassium chloride + Silver nitrate  $\rightarrow$  Potassium nitrate + Silver chloride [ $KCl + AgNO_3 \rightarrow KNO_3 + AgCl$ ] is an example of

- A) simple displacement reaction
- B) decomposition reaction
- C) double decomposition reaction
- D) synthesis or direct combination reaction



**18) Iron + Sulfuric acid  $\rightarrow$  Ferrous sulfate + Hydrogen [Fe + H<sub>2</sub>SO<sub>4</sub>  $\rightarrow$  FeSO<sub>4</sub> + H<sub>2</sub>] is an example of**

- A) decomposition reaction**
- B) simple displacement reaction**
- C) synthesis or direct combination reaction**
- D) double decomposition reaction**

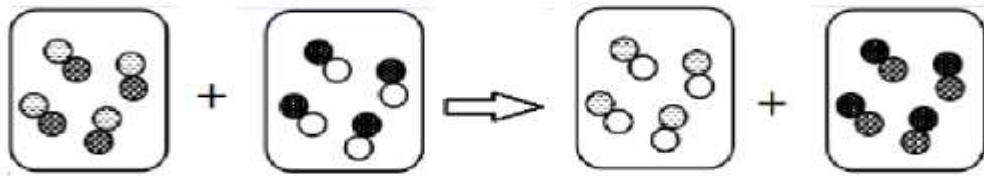
**19) Water (+ electric current)  $\rightarrow$  Hydrogen + Oxygen [2 H<sub>2</sub>O  $\rightarrow$  2 H<sub>2</sub> + O<sub>2</sub>] is an example of**

- A) double decomposition reaction**
- B) decomposition reaction**
- C) synthesis or direct combination reaction**
- D) simple displacement reaction**

**20) Zinc + Hydrochloric acid  $\rightarrow$  Zinc chloride + Hydrogen [Zn + 2 HCl  $\rightarrow$  ZnCl<sub>2</sub> + H<sub>2</sub>] is an example of**

- A) synthesis or direct combination reaction**
- B) simple displacement reaction**
- C) decomposition reaction**
- D) double decomposition reaction**

This reaction can be considered as :



A- Single substitution reaction

B- Synthesis reaction

C- Double substitution reaction

D- Decomposition reaction



22) Consider an aqueous solution of calcium nitrate added to an aqueous solution of sodium phosphate. What is the formula of the solid formed in the reaction?

- A)  $\text{Ca}(\text{PO}_4)_2$
- B)  $\text{CaPO}_4$
- C)  $\text{Ca}_3(\text{PO}_4)_2$
- D)  $\text{Ca}_3(\text{PO}_3)_2$

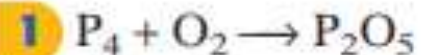
23) In the balanced molecular equation for the neutralization of sodium hydroxide with sulfuric acid, the products are:

- A)  $\text{NaSO}_4 + \text{H}_2\text{O}$
- B)  $\text{NaSO}_3 + 2\text{H}_2\text{O}$
- C)  $2\text{NaSO}_4 + \text{H}_2\text{O}$
- D)  $\text{Na}_2\text{S} + 2\text{H}_2\text{O}$
- E)  $\text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$



## PRACTICE

Write a balanced equation for each of the following.



4 Silicon reacts with carbon dioxide to form silicon carbide, SiC, and silicon dioxide.

5- The reaction of butane,  $\text{C}_4\text{H}_{10}$ , with oxygen the reaction of water with calcium oxide

6-The reaction of lithium with oxygen

7-The decomposition of carbonic acid



**1. Combination (synthesis)**

**Double displacement (double replacement or metathesis)**

**Single displacement (single replacement)**

**Decomposition**

**2)A**

**3)B**

**4)Doble replacement reaction**

**5)12**

**6)C**

**7)E**

**8)A**

**9)C**

**10)B**

**11)C**

**12)A**

**13)C**

**14)D**

**15)C**

**16)A**

**17)C**

**18)B**

**19)B**

**20)B**

**21)C 22)C 23)E**

# Revision Lo8

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**1) What are the two types of pure of substance**

- a) Elements and Subatomic Particles**
- b) Protons and Electron**
- c) Atoms and Compounds**

**2) What are the two types of Mixtures**

- a) Elements and Subatomic Particles**
- b) Protons and Electrons**
- C) Atoms and Compounds**
- d) Homogenous and Heterogeneous**

**3) Which one of the following is not a colloid?**

- A. Milk**
- B. Mud**
- C. Butter**
- D. Boric acid**





**4) Which of the following will show Tyndall effect?**

- A. Aqueous solution of soap below critical micelle concentration**
- B. Aqueous solution of soap above critical micelle concentration**
- C. Aqueous solution of Sodium Chloride**
- D. Aqueous solution of Sugar**

**5) Identify the INCORRECT statement regarding colloids.**

- A. Cheese is an example of Gel in which dispersed phase is liquid and dispersion medium is solid.**
- B. A colloid is a homogeneous system in which one substance is dispersed (dispersed phase) as very fine particles in another substance called dispersion medium.**
- C. The lyophobic colloids are also termed as irreversible sols.**
- D. The formation of associated colloids takes place above Kraft temperature.**

**6) Among the colloids cheese (C), milk (M) and smoke (S), the correct combination of the dispersed phase and dispersion medium, respectively is**

- A. C: liquid in solid; M: liquid in liquid; S: solid in gas**
- B. C: solid in liquid; M: liquid in liquid; S: gas in solid**
- C. C: liquid in solid; M: liquid in solid; S: solid in gas**
- D. C: solid in liquid; M: solid in liquid; S: solid in gas**





**7) In solutions the particles are**

- A. invisible**
- B. visible by naked eye**
- C. visible by ordinary microscope**
- D. visible by electron microscope**

**8) The solution of mercury with other metals is called**

- A. amalgam**
- B. saturated solution**
- C. supersaturated solution**
- D. unsaturated solution**

**9) The particle size in suspension is**

- A. less than  $10^3$  nm**
- B.  $10^2$  nm**
- C. greater than  $10^3$**
- D. 10 nm**



**10) In the presence of crystals of solute, a supersaturated solution is**

- A. not stable**
- B. stable**
- C. cannot be made**
- D. none of above**

**11) Most of the processes in our body occur in**

- A- solid solution**
- B- liquid solution**
- C- gaseous solution.**
- D- colloidal solution**

**12) How can alum help in water purification?**

- A- Forming Si complex with clay particles.**
- B- The sulphate part, which combines with the dirt and removes it**
- C- Aluminum which coagulates the mud particles.**
- D- Making mud water soluble.**



**Answers:**

1)C

2)D

3)D

4)B

5)B

6)A

7)A

8)A

9)C

10)A

11)B

12)C

# Revision Lo9

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The property by which a body returns to its original shape after removal of the force is called.....

- A) Plasticity
- B) Elasticity
- C) Ductility
- D) Malleability

Ans)A

The property of a material by which it can be beaten or rolled into thin plates is called .....

- A) Malleability
- B) Plasticity
- C) Ductility
- D) Elasticity

Ans)A



- **Ability to return to its original position?**

**Ans: Bounce**

- **The tendency of a solid substance to return to its original form after being stretched.**

**Ans: Elasticity (flexibility)**

- **Is the property of how describes how consistent a material is throughout as it shows how the matter is cohesive**

**Ans: Uniformity**

**A member which does not regain its original shape after removal of the load producing deformation is said .....**

- A) Plastic**
- B) Elastic**
- C) Rigid**

**Ans)A**



**Thanks**

**Made by:**

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