

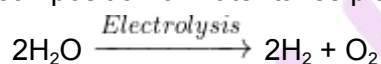
Decomposition Reactions Chemistry Questions with Solutions

Q1: The molar ratio of the liberation of hydrogen and oxygen during their decomposition via electrolysis is:

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

Answer: (b.)

Explanation: During electrolysis, decomposition of water takes place and the reaction accompanied is:



Hence, 2 moles of hydrogen and 1 mole of oxygen are formed.

Q2. A student heats white lead nitrate $[\text{Pb}(\text{NO}_3)_2]$ powder taken in a test tube over the flame. Upon heating, the powder colour changes to yellow along with the emission of some brown fumes. What is the expected product of this decomposition reaction?

- a. PbO , NO_2 and O_2
- b. PbO , NO_2 and NO_3
- c. Pb^{2+} and 2NO_3^{2-}
- d. Pb , N_2 and O_2

Answer: (a.)

Explanation: Upon heating, lead nitrate decomposes to PbO (yellow solid), NO_2 gas (brown fumes) and O_2 gas (colourless).

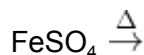
Q3. What are the products of decomposition when AgCl is exposed to light?

- a. Ag_2O (s) + Cl_2 (g)
- b. Ag_2O (s) + 2Cl (g)
- c. 2Ag (s) + Cl_2 (g)
- d. Ag (s) + Cl (g)

Answer: (c.)

Explanation: Upon the exposure to light, AgCl decomposes to elemental Ag and Cl_2

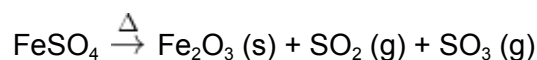
Q4. FeSO_4 (green) upon heating decomposes to a brown solid along with some gaseous emissions. What are the products of the reaction?



- $\text{Fe}^{2+} + \text{SO}_4^{2-}$
- $\text{Fe (s)} + \text{S (s)} + 2\text{O}_2 \text{ (g)}$
- $\text{FeO (s)} + \text{SO}_3 \text{ (g)}$
- $\text{Fe}_2\text{O}_3 \text{ (s)} + \text{SO}_2 \text{ (g)} + \text{SO}_3 \text{ (g)}$

Answer: (d.)

Explanation: The complete reaction is:

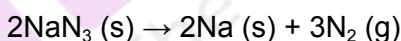


Q5. Name some techniques of analysis in which the decomposition reactions have been deployed.

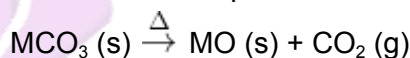
Answer: The decomposition reactions are used in Mass spectroscopy, gravimetric analysis and thermogravimetric analysis (TGA).

Q6. Give one example of a decomposition reaction that has been utilised in automobiles safety solutions.

Answer: Sodium azide $[(\text{NaN}_3)_2]$ gas is used to power the airbags installed in the automobiles to prevent harmful accidental injuries. The $[(\text{NaN}_3)_2]$ breaks down explosively forming Na and N_2 . This happens as and when an electric charge triggered by the automobile impact ignites a sodium azide pellet in the polyamide bag. The equation for this chemical reaction is given hereunder.

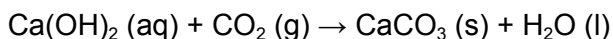


Q7. The thermal decomposition of a metal carbonate produces a metallic oxide and carbon dioxide gas.



How would you test the evolution of carbon dioxide gas from the beaker?

Answer: The evolution of carbon dioxide gas can be detected by passing the evolved gas from the limewater solution. If the evolved gas is carbon dioxide, the clear lime water solution will turn milky due to the formation of solid calcium carbonate.



Q8. Give 3 examples of decomposition reactions.

Answer: The three examples of decomposition reactions are:

- Decomposition of metal oxides and metal chlorides to extract metals by using electrolytic decomposition.
- Electrolysis of water to form hydrogen and oxygen.
- Formation of silver and bromine by the decomposition of AgBr in the presence of sunlight.

Q9. Must the decomposition reaction be endothermic or exothermic?

Answer: During decomposition, the bonds in between the atoms of the compound breaks. The breaking of bonds requires energy. The bonds absorb energy from heat or light to undergo fission. Hence, the decompositions reactions must be endothermic reactions.

Q10. Give an example of a decomposition reaction happening around us in our day-to-day life.

Answer: An example of this is when we open a soft drink bottle and some bubbles come up as the carbon dioxide gas fizzes out. This happens due to the decomposition of carbonic acid present within the soft drink. As soon as the soft drink bottle is opened, the carbonic acid decomposes to form water and carbon dioxide gas.

Q11. What is autolysis?

Answer: It is the breakdown of either all or some part of cells or tissues by the action of the cell's own enzymes. The product of this decomposition involves water and some gases.

Q12. Calculate the unit of rate for the given reaction:



Given Rate = $k[\text{p}_{\text{CH}_3\text{OCH}_3}]^{3/2}$ and all the units of pressure and time are to be calculated in bar and minutes respectively.

Answer: From the given rate expression: Rate = Pressure change / Time change
Hence, the unit of rate is bar min^{-1} .

Q13. Give any 5 uses of Decomposition reactions.

Answer: The 5 uses of Decomposition reactions are:

- Thermite Welding
- Production of CaO
- In extraction of metals from their ores
- In the generation of photographic films
- To curb from indigestion

Q14. What are the different types of Decomposition Reactions?

Answer: There are 3 different kinds of Decomposition reactions namely:

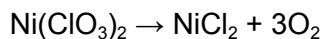
- Thermal decomposition reactions
- Electrolytic decomposition reactions
- Photolytic decomposition reactions

Q15. Predict the product if the following compounds undergo Decomposition reactions.

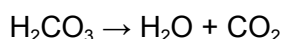
- a. $\text{Ni}(\text{ClO}_3)_2 \rightarrow$
- b. $\text{H}_2\text{CO}_3 \rightarrow$

Answer: The decomposition products of the given compounds are:

- a. Nickel chlorate upon decomposition would form nickel chloride and oxygen.



- b. Carbonic acid upon decomposition forms carbon dioxide and water.



Practise Questions on Decomposition reactions

Q1. Write an equation for each of the decomposition reactions that occur in the presence of heat, light and electricity.

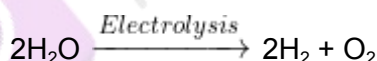
Answer: a. When energy is supplied in the form of heat: Calcium carbonate (CaCO_3) on heating breaks down into quicklime (CaO) and carbon dioxide.



- c. When energy is supplied in the form of light: Silver chloride is a white coloured substance that turns grey in the presence of sunlight. This is due to the decomposition of AgCl to metallic silver and chlorine gas.



- d. When energy is provided in the form of electricity: water is dissociated into its constituting elements i.e. hydrogen and oxygen by passing electricity through it. This is called electrolysis of water.



Q2. The reaction: $\text{Fe}_2\text{O}_3 + 2\text{Al} \rightarrow \text{Al}_2\text{O}_3 + 2\text{Fe}$ is an example of

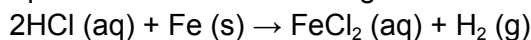
- a. Combination reaction
- b. Displacement reaction
- c. Decomposition reaction
- d. Double displacement reaction

Answer: (b.)

Explanation: Since Al is more reactive than Fe, Al replaces Fe from its compound Fe_2O_3 . The reaction in which a more reactive element replaces a lesser reactive element from its compound is known as the displacement reaction. Hence, the above given reaction is an example of displacement reaction.

Q3. What happens when the dilute hydrochloric acid (HCl) is added to some iron fillings?

Answer: As soon as the dil. HCl is added to the iron fillings, bubbles of a gas are observed leaving the solution. This happens because Iron being more reactive than hydrogen displaces it from HCl and hence forms iron chloride. The equation for this reaction is given below:



Q4. Why should the chemical equations be balanced?

Answer: The balancing of a chemical reaction is required because:

- An unbalanced equation is not the correct manner of representing the chemical reaction.
- Since all of the reactions follow the law of conservation of mass, the amount of elements of each type present in the reactants must be equal to the amount of the respective elements obtained in the new product formed.
- The total mass of the reactants used must be equal to the total mass of the products thus formed.

Q5. Write the following statement of the given reaction into a balanced chemical equation form. Barium chloride reacts with aluminium sulphate to give aluminium chloride and barium sulphate.

Answer: The given statement can be put into a balanced chemical equation as:

