CHEMICAL REACTIONS COMBINATION AND DECOMPOSITION REACTIONS

SOLUTIONS

TEACHING TASK

JEE MAINS LEVEL QUESTIONS

1.When calcium nitrate ($Ca(NO_3)_2$) is heated strongly, it decomposes to give:

A) $CaO + N_2 + O_2$ B) $CaO + NO_2 + O_2$ C) $Ca(NO_2)_2 + O_2$ D) $Ca + N_2 + 3O_2$

Solution: $2Ca(NO_3)_2 \rightarrow 2CaO + 4NO_2 + O_2$

Answer:B

2.Which shows element + compound combination?

A) $2SO_2 + O_2 \rightarrow 2SO_3$

B) $Cl_2 + 2KI \rightarrow 2KCl + I_2$

C) $2Na + Cl_2 \rightarrow 2NaCl$

D) $CO_2 + C \rightarrow 2CO$

Solution:SO_2 (sulfur dioxide) is a compound.

O_2 (oxygen) is an element.

Here, an element ($O_{2)}$ reacts with a compound (SO_2) to form a new compound (SO_3).

Answer:A

3.Molten Al_2O_3 electrolysis produces:

A) $Al + O_3$ B) $Al + O_2$ C) $Al_2 + O_2$ D) $Al^{3+} + O^{2-}$

Solution: $2Al_2O_3 \xrightarrow{Electrolysis} 4Al + 3O_2$

Answer:B

4.$(NH_4)_2Cr_2O_7 \rightarrow$ X + Y + Z. Products are:

A) $N_2 + Cr_2O_3 + H_2O$ B) $NH_3 + CrO_3 + H_2$ C) $NO_2 + CrO_4 + H_2$ D) $N_2O + Cr_2O_5 + H_2O$

Solution: $(NH_4)_2Cr_2O_7 \rightarrow N_2 + Cr_2O_3 + 4H_2O$

Answer:A

5.Silver bromide decomposition in photography:

A) Endothermic B) Exothermic C) Redox D) Both B & C

Solution:

$2AgBr \xrightarrow{light} 2Ag + Br_2$

The decomposition of AgBr is both endothermic and a redox reaction.

Answer:A,C

6.Haematite (Fe_2O_3) reduction in blast furnace involves:

A) CO as reducing agent B) Electrolysis C) Thermal decompositionD) Photolysis

Solution: $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

CO as reducing agent

Answer:A

7.Ozone decomposition is unusual because:
A) It's endothermic **B) It's exothermic despite being decomposition**
C) It produces atomic oxygen **D) It requires catalyst**
Solution:The decomposition of ozone (O_3)is unusual because it is exothermic despite being a decomposition reaction
Answer:B
8.$H_2CO_3 \rightarrow$ X + Y. Products are:
A) $H_2 + CO_3$ **B) $H_2O + CO$** **C) $H_2O + CO_2$** **D) $H_2 + CO_2$**
Solution: $H_2CO_3 \rightarrow H_2O + CO_2$
Answer:C
9.$Fe_2O_3 + 2Al \rightarrow 2Fe + Al_2O_3$ is:
A) Displacement + Exothermic **B) Combination + Endothermic**
C) Decomposition **D) Double displacement**
Solution:Displacement (Single Replacement): Aluminum (Al) displaces iron (Fe) from Fe2O3 because Al is more reactive.
Exothermic: The reaction releases a tremendous amount of heat (enough to melt the iron produced).
Answer:A
10.$CO + H_2O \rightarrow CO_2 + H_2$ is:
A) Redox + Exothermic **B) Combination** **C) Decomposition** **D) Photochemical**
Solution:Redox (Oxidation-Reduction):
Carbon in CO is oxidized from +2 to +4 (in CO_2).
Hydrogen in H_2O is reduced from +1 to 0 (in H_2).
Exothermic: The reaction releases heat ($\Delta H \approx$ -41 kJ/mol at standard conditions).
Answer:A

JEE ADVANCED LEVEL QUESTIONS

Multi correct answer type:
11. Which of the following reactions are exothermic decomposition reactions?
A) $2Pb(NO_3)_2 \rightarrow 2PbO + 4NO_2 + O_2$ (Brown gas evolution)
B) $2KClO_3 \rightarrow 2KCl + 3O_2$ (Catalyzed by MnO_2)
C) $(NH_4)_2Cr_2O_7 \rightarrow N_2 + Cr_2O_3 + 4H_2O$ (Volcano experiment)
D) $CaCO_3 \rightarrow CaO + CO_2$ (Limestone calcination)
Solution:A) $2Pb(NO_3)_2 \rightarrow 2PbO + 4NO_2 + O_2$ (Brown gas evolution)
This is a thermal decomposition reaction requiring heat.
It absorbs heat $\rightarrow$ Endothermic
B) $2KClO_3 \rightarrow 2KCl + 3O_2$ (Catalyzed by MnO_2)
Also a thermal decomposition reaction
Endothermic, even though catalyst (MnO_2) lowers the temperature needed
C) $(NH_4)_2Cr_2O_7 \rightarrow N_2 + Cr_2O_3 + 4H_2O$ (Volcano experiment)
This is a famous exothermic decomposition
Releases heat, sparks, and steam
D) $CaCO_3 \rightarrow CaO + CO_2$ (Limestone calcination)
Decomposition: Ammonium dichromate breaks down into multiple products.
D) $CaCO_3 \rightarrow CaO + CO_2$ (Limestone calcination)
Requires high heat, used in lime kilns.Hence, it is endothermic

Answer:C

12.Select decomposition reactions that can be driven by electrolysis:

A) $2H_2O \rightarrow 2H_2 + O_2$ (Acidified water)

B) $2Ag_2O \rightarrow 4Ag + O_2$ (Silver oxide decomposition)

C) $2Al_2O_3 \rightarrow 4Al + 3O_2$ (Hall-Héroult process)

D) $2NaCl \rightarrow 2Na + Cl_2$ (Down's process)

Solution:A) $2H_2O \rightarrow 2H_2 + O_2$ (Acidified water)

Electrolysis of Water: Direct current splits water into hydrogen and oxygen.

Key Point: Requires an electrolyte (e.g., dilute H2SO4) to enhance conductivity.

B) $2Ag_2O \rightarrow 4Ag + O_2$ (Silver oxide decomposition)

Thermal Decomposition: Silver oxide decomposes on heating (~300°C), not via electrolysis.

Key Point: No external electric current is needed.

C) $2Al_2O_3 \rightarrow 4Al + 3O_2$ (Hall-Héroult process)

Electrolysis of Molten Al2O3: Cryolite (Na3AlF6) lowers the melting point, enabling aluminum extraction.

Key Point: Industrial method for producing aluminum.

D) $2NaCl \rightarrow 2Na + Cl_2$ (Down's process)

Electrolysis of Molten NaCl: Produces sodium metal and chlorine gas.

Key Point: Requires high temperatures to melt NaCl.

Answer:A,C,D

Statement Type:

13. Statement I: The reaction $2KClO_3 \rightarrow 2KCl + 3O_2$ is a decomposition reaction that releases oxygen gas.

Statement II: Potassium chlorate decomposes because chlorine is more electronegative than oxygen, causing O_2 liberation.

Solution:Statement I:

"The reaction **$2KClO_3 \rightarrow 2KCl + 3O_2$** is a decomposition reaction that releases oxygen gas."(True.)

This is a classic thermal decomposition reaction where potassium chlorate (KClO3) breaks down into potassium chloride (KCl) and oxygen gas (O2).

The evolution of O2 gas is a key observation (often tested in labs with a glowing splint).

Statement II:

"Potassium chlorate decomposes because chlorine is more electronegative than oxygen, causing O_2 liberation."(False).

The real reason for decomposition is the instability of the chlorate ion (ClO_3^-) upon heating, not electronegativity.

While chlorine (Cl) is indeed more electronegative than oxygen (O), this does not directly explain O_2 release. The reaction occurs because heating provides enough energy to break the weaker Cl–O bonds, favoring the formation of stable O2 and KCl.

Answer:C

14. Statement I: Heating $[Co(NH_3)_5Cl]Cl_2$ at 150°C results in a color change from pink to violet, indicating decomposition.

Statement II: The reaction $[Co(NH_3)_5Cl]Cl_2 \rightarrow [Co(NH_3)_5Cl]^{2+} + 2Cl^-$ involves

breaking of Co-N coordinate bonds.
Solution:
Statement-I:True
The pentamminechlorocobalt(III) chloride complex does undergo thermal decomposition at elevated temperatures.
The color change from pink to violet is characteristic of changes in cobalt complex coordination geometry (from octahedral to possibly tetrahedral or other configurations).
This is indeed indicative of chemical decomposition.
Statement-II:False
The equation shown represents simple ionic dissociation in solution, not thermal decomposition.
This dissociation does not break any Co-N coordinate bonds - it only separates the counterions (Cl^-) from the complex cation.
Actual thermal decomposition at 150°C would involve breaking of Co-N bonds and more extensive structural changes.
The color change in Statement I results from more fundamental changes in the coordination sphere than just ionic dissociation.
Answer:C
Comprehension Type:
Comprehension - I
15. Which of the following is a correct example of a combination reaction?
A) ($2H_2O \rightarrow 2H_2 + O_2$) B) ($H_2 + Cl_2 \rightarrow 2HCl$)
C) ($2KClO_3 \rightarrow 2KCl + 3O_2$)D) ($CaCO_3 \rightarrow CaO + CO_2$)
Solution:A combination reaction is defined as a reaction where two or more reactants combine to form a single product. ($H_2 + Cl_2 \rightarrow 2HCl$)
Answer:B
16. Which statement about combination reactions is correct?
A) They always require heat to proceed.
B) They produce more than one product.
C) They involve the formation of a single compound from simpler substances.
D) They only occur between two elements, never compounds.
Solution:Combination reactions always form a single product from multiple reactants.
Answer:C
Comprehension - II
17. Which of the following best describes a decomposition reaction?
A) Two or more reactants combine to form a single product.
B) A single compound breaks down into simpler substances (elements or new compounds).
C) One element replaces another in a compound.
D) Ions exchange partners between two compounds.
Solution:A decomposition reaction is defined as ,A single compound breaks down into two or more simpler substances (which can be elements or new compounds).
Answer:B
18.What is typically required to initiate a decomposition reaction?
A) A catalyst only B) An energy source (heat, light, or electricity)

C) A solvent **D) Another reactant**

Solution:Decomposition reactions always need energy to proceed, whether from heat, light, or electricity.

Answer:B

Integer type:

19.Number of products formed when potassium chlorate ($KClO_3$) decomposes thermally?

Solution: $2KClO_3 \xrightarrow{\Delta} 2KCl + 3O_2$

Answer:2

20.Number of gaseous products formed when ammonium dichromate ($(NH_4)_2Cr_2O_7$) decomposes?

Solution:When ammonium dichromate ($(NH_4)_2Cr_2O_7$) decomposes, it produces two gaseous products:

Nitrogen gas ,Water vapor

$(NH_4)_2Cr_2O_7 \xrightarrow{\Delta} N_2 + Cr_2O_3 + 4H_2O$

Answer:2

Matrix Matching Type:

21.

Column-I	**Column-II**
A. Chile saltpetre	1. KNO_3
B. Lunar caustic	2. $Na_2CO_3 \cdot 10H_2O$
C. Washing soda	3. $AgNO_3$
D. Indian saltpetre	4. $NaNO_3$
E. Philosopher's wool	5. ZnO

Solution:A. Chile saltpetre $\rightarrow$ 4. $NaNO_3$ (Sodium nitrate, a major natural source of nitrates).

B. Lunar caustic $\rightarrow$3. $AgNO_3$ (Silver nitrate, historically used in medicine and photography).

C. Washing soda $\rightarrow$ 2. $Na_2CO_3 \cdot 10H_2O$ (Hydrated sodium carbonate, used in detergents).

D. Indian saltpetre $\rightarrow$ 1. KNO_3 (Potassium nitrate, used in gunpowder and fertilizers).

E. Philosopher's wool $\rightarrow$ 5. ZnO (Zinc oxide, a white powder formed by burning zinc in air).

Answer:A-4 ,B-3, C-2,D-1,E-5

LEARNERS TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

1. $2H_2 + O_2 \rightarrow 2H_2O$ is an example of:
A) Decomposition B) Combination C) Displacement D) Redox
Solution:Combination Reaction (B)
Definition: A reaction where two or more reactants combine to form a single product.
Here: Hydrogen (H_2) and oxygen (O_2) combine to form water (H_2O).
Key Point: Only one product is formed.
Answer:B

2.Thermal decomposition of $CaCO_3$ produces:
A) CaO + CO B) Ca + CO_2 C) CaO + CO_2 D) $CaC_2 + O_2$

Solution: $CaCO_3 \xrightarrow{\Delta} CaO + CO_2$

Answer:C

3.Which reaction releases oxygen gas?
A) $2KClO_3 \rightarrow 2KCl + 3O_2$ B) $2H_2 + O_2 \rightarrow 2H_2O$
C) $Na + Cl_2 \rightarrow NaCl$ D) $Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$
Solution:This is a classic thermal decomposition reaction where potassium chlorate ($KClO_3$) breaks down when heated to produce potassium chloride (KCl) and oxygen gas (O_2). The release of oxygen gas is a key characteristic of this reaction.
Answer:A

4.The reaction Fe + S $\rightarrow$ FeS is a:
A) Synthesis reaction B) Displacement reaction
C) Decomposition reaction D) Neutralization reaction
Solution:Synthesis (Combination) Reaction:
Definition: A reaction where two or more simple substances combine to form a more complex compound.
Answer:A

5. Electrolysis of water is a:
A) Combination reaction B) Decomposition reaction
C) Displacement reaction D) None

Solution: $2H_2O \xrightarrow{Elecricity} 2H_2 + O_2$

Answer:B

6.Which is not a decomposition reaction?
A) $2HgO \rightarrow 2Hg + O_2$ B) $2AgCl \rightarrow 2Ag + Cl_2$
C) $2NH_3 \rightarrow N_2 + 3H_2$ D) $2Na + Cl_2 \rightarrow 2NaCl$
Solution:Decomposition reactions involve one reactant breaking down into two or more products
Answer:D

7.Photodecomposition of AgBr is used in:
A) Photography B) Electroplating
C) Smelting D) Catalysis

Solution: AgBr decomposes under light to form silver (Ag) and Br_2, capturing images on photographic film.

Answer:A

8.The reaction $2NH_4Cl + Ca(OH)_2 \rightarrow CaCl_2 + 2NH_3 + 2H_2O$ is:

A) Combination B) Double displacement

C) Decomposition D) Displacement

Solution:

Double Displacement Reaction: A reaction where two compounds exchange ions to form two new compounds.

Answer:B

9.Which requires an energy source?

A) $N_2 + 3H_2 \rightarrow 2NH_3$ B) $2H_2O \rightarrow 2H_2 + O_2$

C) $Mg + O_2 \rightarrow 2MgO$ D) $HCl + NaOH \rightarrow NaCl + H_2O$

Solution:$2H_2O \rightarrow 2H_2 + O_2$

This reaction requires an energy source because:

It's a decomposition reaction (breaking water molecules apart)

Water molecules are very stable - their bonds require significant energy to break

In practice, this reaction needs either:

Electrical energy (electrolysis)

High thermal energy (thermolysis at ~2500°C)

Answer:B

10.The reaction $2Al + Fe_2O_3 \rightarrow Al_2O_3 + 2Fe$ is:

A) Endothermic B) Exothermic C) Photochemical D) Electrolytic

Solution:This is the thermite reaction, known for its intense heat release

Answer:B

11.How many products form when $(NH_4)_2Cr_2O_7$ decomposes?

A) 2 B) 3 C) 4 D) 5

Solution:$(NH_4)_2Cr_2O_7 \xrightarrow{\Delta} N_2 + Cr_2O_3 + H_2O$ 4

Answer:B

12. Which decomposition reaction is used in airbags?

A) $2NaN_3 \rightarrow 2Na + 3N_2$ B) $2KClO_3 \rightarrow 2KCl + 3O_2$

C) $CaCO_3 \rightarrow CaO + CO_2$ D) $2H_2O_2 \rightarrow 2H_2O + O_2$

Solution: $2NaN_3 \rightarrow 2Na + 3N_2$

When a collision occurs, an electric trigger detonates sodium azide (NaN3).

The compound rapidly decomposes into:

Sodium metal (Na)

Nitrogen gas (N_2)

The N_2 gas inflates the airbag in milliseconds.

Answer:A

13.The Hall-Héroult process involves electrolytic decomposition of:

A) Al_2O_3 B) Fe_2O_3 C) Cu_2S D) ZnO

Solution:This industrial method extracts aluminum metal from purified alumina (Al_2O_3).

Answer:A

14.Which reaction is both decomposition and redox?
A) $2Pb(NO_3)_2 \rightarrow 2PbO + 4NO_2 + O_2$ B) $CaO + CO_2 \rightarrow CaCO_3$
C) $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$ D) $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$
Solution:$2Pb(NO_3)_2 \rightarrow 2PbO + 4NO_2 + O_2$
This reaction is both a decomposition and a redox reaction:
Decomposition:A single compound (lead nitrate, $Pb(NO_3)_2$ breaks down into three simpler substances (PbO, NO_2, O_2).
Redox:
Oxidation: Nitrogen in NO_3^- goes from +5 (in $Pb(NO_3)_2$ to +4 (in NO2).
Reduction: Oxygen in NO_3^- goes from -2 (in $Pb(NO_3)_2$ to 0 (in O2).
Answer:A
15.The number of gaseous products in the decomposition of NH_4NO_3 is:
A) 1 B) 2 C) 3 D) 0
Solution: $NH_4NO_3 \xrightarrow{\Delta} N_2O + 2H_2O$
Gaseous Products:
Nitrous oxide (N_2O) – A colorless gas
Water vapor (H_2O) – Exists as gas at decomposition temperatures (~200–250°C)
Answer:B

JEE MAINS LEVEL QUESTIONS

16.Which is a thermal decomposition reaction?
A) $2HgO \rightarrow 2Hg + O_2$ B) $H_2 + Cl_2 \rightarrow 2HCl$
C) $NaOH + HCl \rightarrow NaCl + H_2O$ D) $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$
Solution:$2HgO \rightarrow 2Hg + O_2$
Answer:A
17. Electrolytic decomposition of NaCl produces:
A) $Na + Cl_2$ B) $Na + Cl$ C) $Na_2 + Cl_2$ D) $Na^+ + Cl^-$
Solution: $2NaCl \xrightarrow{Electrolysis} 2Na + Cl_2$
Answer:A
18. Photodecomposition is involved in:
A) Rusting of iron B) Black & white photography ($AgBr \rightarrow Ag + Br_2$)
C) Burning of methane D) Electroplating
Solution:Photodecomposition refers to chemical decomposition triggered by light energy.
Silver Bromide (AgBr) in Photography:
Photographic film contains AgBr crystals.
When light hits AgBr, it decomposes:
$AgBr \rightarrow Ag + Br_2$
The silver atoms (Ag) form a latent image, which is later developed into a visible photography
Answer:B
19.Which is a combination reaction?
A) $2H_2O \rightarrow 2H_2 + O_2$ B) $CaO + CO_2 \rightarrow CaCO_3$

C) $2KClO_3 \rightarrow 2KCl + 3O_2$ D) $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$
Solution:A combination reaction occurs when two or more reactants combine to form a single product
$CaO + CO_2 \rightarrow CaCO_3$
Answer:B
20.Synthesis of ammonia ($N_2 + 3H_2 \rightarrow 2NH_3$) is:
A) Endothermic B) Exothermic C) Redox D) Both B & C
Solution:Exothermic (B):
The reaction releases heat (ΔH = -92 kJ/mol at standard conditions).
Industrial Haber process uses this heat release for efficiency.
Redox (C):
Oxidation: Hydrogen (H_2) goes from 0 to +1 in NH_3.
Reduction: Nitrogen (N_2) goes from 0 to -3 in NH_3.
Answer:D
21.Which process is purely physical?
A) Burning of paper B) Melting of ice
C) Fermentation of glucose D) Respiration
Solution:A purely physical process involves a change in state or appearance without altering the chemical composition of the substance.
Melting of Ice (B):
$H_2O(s) \rightarrow H_2O(l)$
Only the physical state changes (solid $\rightarrow$ liquid); no new substances form.
Answer:B
22.Ripening of fruits involves:
A) Oxidation B) Decomposition C) Enzymatic reactions D) All of the above
Solution:The ripening of fruits is a complex biochemical process involving:
Oxidation (A):
Oxygen interacts with fruit tissues, altering pigments (e.g., chlorophyll breaks down, revealing carotenoids).
Example: Ethylene (C_2H_4) production, a key ripening hormone, involves oxidative reactions.
Decomposition (B):
Complex carbohydrates (like starch) break down into simpler sugars (e.g., glucose, fructose), making the fruit sweeter.
Cell walls degrade (pectin breakdown), softening the fruit.
Enzymatic Reactions (C):
Enzymes like amylase (starch $\rightarrow$ sugar), pectinase (cell wall softening), and cellulase drive these changes.
Ethylene gas triggers enzyme production, accelerating ripening.
Answer:D
23.Industrial production of lime (CaCO3 $\rightarrow$ CaO + CO2) is:
A) Endothermic B) Exothermic C) Photochemical D) Electrolytic
Solution:The reaction requires continuous heat input (ΔH = +178 kJ/mol) to proceed.
Temperatures of 900–1200°C are needed to decompose limestone (CaCO3).
Answer:A
24. In the thermite reaction ($Fe_2O_3 + 2Al \rightarrow 2Fe + Al_2O_3$), the role of Al is:

A) Oxidizing agent B) Reducing agent C) Catalyst D) Spectator ion
Solution:Oxidation State Change: Al goes from 0 (in Al) to +3 (in Al_2O_3).
Behavior: It donates electrons to reduce Fe_2O_3, making it the reducing agent.
Answer:B
25.Number of gaseous products in $(NH_4)_2Cr_2O_7 \rightarrow Cr_2O_3 + N_2 + 4H_2O$:
A) 1 B) 2 C) 3 D) 0
Solution:When ammonium dichromate ($(NH_4)_2Cr_2O_7$) decomposes, it produces two gaseous products:
Nitrogen gas ,Water vapor
Answer:B

JEE ADVANCED LEVEL QUESTIONS

Multi correct answer type:
26. The reaction $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$ represents:
A) A redox reaction B) A synthesis reaction C) A combination reaction D) A decomposition reaction
Solution:Above reaction is A redox reaction, A synthesis reaction, A combination reaction
Answer:A,B,C
27. The reaction $4Fe(s) + 3O_2(g) + xH_2O \rightarrow 2Fe_2O_3 \cdot xH_2O(s)$ represents:
A) A corrosion process B) A combination reaction
C) An exothermic redox reaction D) A photochemical reaction
Solution:Corrosion Process (A):
This is the rusting of iron, where Fe reacts with O_2 and H_2O to form hydrated iron(III) oxide (rust, $Fe_2O_3 \cdot xH_2O$).
Combination Reaction (B):
Multiple reactants ($Fe + O_2 + H_2O$) combine to form a single product ($Fe_2O_3 \cdot xH_2O$).
Exothermic Redox Reaction (C):
Oxidation: Iron (Fe) goes from 0 to +3 (in Fe_2O_3).
Reduction: Oxygen (O_2) goes from 0 to -2 (in Fe_2O_3 and H_2O).
The reaction releases heat (exothermic), though rusting is slow.
Answer:A,B,C

Statement Type:
28. Statement I: Magnesium ribbon burns in air with a dazzling white flame to form magnesium oxide.
Statement II: Magnesium reacts with hydrochloric acid to produce magnesium chloride and hydrogen gas.
Solution:
Statement I:True. This is a classic demonstration of magnesium combustion:
$2Mg + O_2 \rightarrow 2MgO$
The reaction is highly exothermic, producing intense white light
Statement II:True. This is a standard single displacement reaction:
$Mg + 2HCl \rightarrow MgCl_2 + H_2$
However, Statement II does NOT explain Statement I. They describe two entirely different chemical reactions of magnesium:

Statement I describes combustion with oxygen
Statement II describes an acid-metal reaction
There is no causal or explanatory relationship between them.
Answer:B
29. Statement I: When copper (II) sulphate reacts with iron, a brown deposit of copper is formed.“
Statement II: This reaction is an example of a decomposition reaction, where copper sulphate breaks into copper and sulphur.
Solution:
Statement I:True. This is a classic single displacement reaction
$Fe + CuSO_4 \rightarrow FeSO_4 + Cu$
The brown deposit is elemental copper (Cu) forming on the iron surface.
Statement II:False. This is incorrect because:
It's not decomposition - it's a displacement reaction (iron replaces copper)
Copper sulphate doesn't break into copper and sulphur - the sulphate ($SO4^{2}$?) remains intact
The products are copper metal and iron sulphate, not elemental sulphur
Answer:C
Comprehension Type:
30. $C + O_2 \rightarrow CO_2$ + heat is an example of:“
A) Combination reaction B) Exothermic reaction
C) Decomposition reaction D) Both A & B
Solution:Combination Reaction (A):
Two reactants (C and O_2) combine to form a single product (CO_2).
Exothermic Reaction (B):
The +heat indicates energy is released (ΔH = -393.5 kJ/mol for complete combustion).
Answer:D
Integer type:
31. How many products are formed when calcium oxide (CaO) reacts with water (H_2O) in a combination reaction?
Solution: $CaOHOCaOH_{22}$ ()
Answer:1

Matrix Matching Type:
32.Solution:

COLUMN -I	**COLUMN-II**
A) $CaO + H_2O \rightarrow Ca(OH)_2$	1) Combination reaction
B) $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$	2) Displacement reaction
C) $2AgCl \rightarrow 2Ag + Cl_2$ (in sunlight)	3) Photodecomposition reaction“
D) $Na_2CO_3 \rightarrow Na_2O + CO_2$ (on heating)	4) Thermal decomposition reaction

Answer:A-1,B-2,C-3,D-4

KEY

				TEACHING TASK					
1	2	3	4	5	6	7	8	9	10
B	A	B	A	A,C	A	B	C	A	A
11	12	13	14	15	16	17	18	19	20
C	ACD	C	C	B	C	B	B	2	2
21									
A-4,B-3,C-2,D-1,E-5									
				LEARNERS TASK					
1	2	3	4	5	6	7	8	9	10
B	C	A	A	B	D	A	B	B	B
11	12	13	14	15	16	17	18	19	20
B	A	A	A	B	A	A	B	B	D
21	22	23	24	25	26	27	28	29	30
B	D	A	B	B	ABC	ABC	B	C	D
31	32								
1	A-1,B-2,C-3,D-4								