

Chem 10 Chapter 7

Chemical Reactions

Practice and End of Chapter Questions

Worked solutions at the end

Use your course periodic table and a calculator as needed. Show the setup, include units, and round at the end. Question numbers match the numbers in the solutions. Use heading navigation to move between sections.

Practice Questions

Question 1

When the equation, $\text{___ O}_2 + \text{___ C}_6\text{H}_{14} \rightarrow \text{___ CO}_2 + \text{___ H}_2\text{O}$ is balanced, the coefficient of O_2 is:

- A) 3
- B) 19
- C) 10
- D) 38
- E) none of the above

Question 2

The mixing of sodium metal and chlorine gas would be the type of reaction known as:

- A) gas evolution
- B) oxidation-reduction
- C) neutralization
- D) precipitation
- E) none of the above

Question 3

A reaction in which a substance reacts with oxygen, emitting heat and forming oxygen-containing compounds is an example of a(n):

- A) precipitation reaction.
- B) acid-base reaction.
- C) combustion reaction.
- D) gas evolution reaction.
- E) none of the above

Question 4

When the equation, $\text{___ N}_2 + \text{___ H}_2 \rightarrow \text{___ NH}_3$ is balanced, the coefficient of hydrogen is:

- A) 1
- B) 2
- C) 3
- D) 4
- E) none of the above

Question 5

What are the coefficients for the following reaction when it is properly balanced?

$\text{___ nitrogen monoxide} + \text{___ carbon monoxide} \rightarrow \text{___ nitrogen} + \text{___ carbon dioxide}$

- A) 1, 1, 2, 2
- B) 2, 2, 2, 1
- C) 2, 2, 1, 2
- D) 2, 1, 1, 2
- E) none of the above

Question 6

Which of the following compounds is INSOLUBLE?

- A) magnesium iodide
- B) magnesium phosphate
- C) magnesium nitrate
- D) magnesium sulfate
- E) none of the above

Question 7

Which of the following compounds is SOLUBLE?

- A) aluminum hydroxide
- B) aluminum sulfide
- C) aluminum sulfate
- D) aluminum carbonate
- E) none of the above

Question 8

When solid NaCl is stirred into water, which of the following is NOT true?

- A) The solution will conduct electricity.
- B) Individual sodium and chloride ions are present.
- C) The NaCl will fail to dissociate.
- D) The solution will taste salty.
- E) none of the above

Question 9

If you had an aqueous mixture that contained Ag^+ , K^+ , and Pb^{2+} cations, how many different solids could precipitate if a chloride solution was added?

- A) 1
- B) 2
- C) 3
- D) 4
- E) no solids will precipitate

Question 10

What would be the formula of the precipitate that forms when $\text{Pb}(\text{NO}_3)_2$ (aq) and K_2SO_4 (aq) are mixed?

- A) $\text{K}(\text{NO}_3)_2$
- B) PbSO_4
- C) H_2O
- D) PbK_2
- E) none of the above

Question 11

Considering the precipitation reaction $\text{Pb}(\text{NO}_3)_2(\text{aq}) + 2 \text{KI}(\text{aq}) \rightarrow \text{PbI}_2(\text{s}) + 2 \text{KNO}_3(\text{aq})$, what is the correct complete ionic equation? All separated ions below are aqueous.

- A) $\text{Pb}^{2+} + 2 \text{NO}_3^- + 2 \text{K}^+ + \text{I}^- \rightarrow \text{PbI}_2(\text{s}) + 2 \text{K}^+ + \text{NO}_3^-$
- B) $\text{Pb}^{2+} + 2 \text{NO}_3^- + 2 \text{K}^+ + 2 \text{I}^- \rightarrow \text{Pb}^{2+} + 2 \text{I}^- + 2 \text{K}^+ + 2 \text{NO}_3^-$
- C) $\text{Pb}^{2+} + (\text{NO}_3)_2^{2-} + 2 \text{K}^+ + 2 \text{I}^- \rightarrow \text{PbI}_2(\text{s}) + 2 \text{K}^+ + 2 \text{NO}_3^-$
- D) $\text{Pb}^{2+} + 2 \text{NO}_3^- + 2 \text{K}^+ + 2 \text{I}^- \rightarrow \text{PbI}_2(\text{s}) + 2 \text{K}^+ + 2 \text{NO}_3^-$
- E) none of the above

Question 12

Considering the following precipitation reaction: $\text{Pb}(\text{NO}_3)_2(\text{aq}) + 2\text{KI}(\text{aq}) \rightarrow \text{PbI}_2(\text{s}) + 2\text{KNO}_3(\text{aq})$ What is the correct net ionic equation?

- A) $\text{Pb}^{2+} + 2\text{I}^- \rightarrow \text{PbI}_2(\text{s})$
- B) $\text{Pb}^{2+} + 2\text{NO}_3^- + 2\text{K}^+ + 2\text{I}^- \rightarrow \text{PbI}_2(\text{s}) + 2\text{K}^+ + 2\text{NO}_3^-$
- C) $2\text{NO}_3^- + 2\text{K}^+ \rightarrow 2\text{KNO}_3$
- D) $\text{Pb}^{2+} + \text{I}_2^- \rightarrow \text{PbI}_2(\text{s})$
- E) none of the above

Question 13

Which is a spectator ion from the following complete ionic equation: $\text{Ag}^+(\text{aq}) + \text{NO}_3^-(\text{aq}) + \text{K}^+(\text{aq}) + \text{Br}^-(\text{aq}) \rightarrow \text{AgBr}(\text{s}) + \text{K}^+(\text{aq}) + \text{NO}_3^-(\text{aq})$

- A) Br^-
- B) Ag^+
- C) AgBr
- D) K^+
- E) none of the above

Question 14

What is the net ionic equation for the reaction of hydrochloric acid with potassium hydroxide?

- A) $\text{HCl} + \text{KOH} \rightarrow \text{H}_2\text{O} + \text{KCl}$
- B) $\text{H}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O}$
- C) $2\text{H}^+ + 2\text{Cl}^- + \text{K}^{2+} + 2\text{OH}^- \rightarrow \text{H}_2\text{O} + \text{K}^{2+} + 2\text{Cl}^-$
- D) $\text{H}^+ + \text{Cl}^- + \text{K}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O} + \text{K}^+ + \text{Cl}^-$
- E) none of the above

Question 15

Which of the following types of compounds will NOT undergo a gas evolution reaction when acid is added?

- A) carbonates
- B) sulfides
- C) hydroxides
- D) bisulfites
- E) none of the above

Question 16

Which of the following would NOT be a product from mixing hydrochloric acid with a solution of sodium sulfite?

- A) NaCl (aq)
- B) H₂O (l)
- C) SO₂ (g)
- D) H₂ (g)
- E) none of the above

Question 17

Which of the following statements about redox reactions is FALSE?

- A) A reaction can result in either oxidation or reduction, not both.
- B) Oxidation is the loss of electrons.
- C) A reaction involving elemental oxygen is a redox reaction.
- D) Reduction is the gain of electrons.
- E) All of the above statement are true.

Question 18

Identify the double displacement reactions among the following:

1. $\text{KCl(aq)} + \text{AgNO}_3\text{(aq)} \rightarrow \text{AgCl(s)} + \text{KNO}_3\text{(aq)}$
2. $\text{Na}_2\text{SO}_4\text{(aq)} + \text{BaCl}_2\text{(aq)} \rightarrow \text{BaSO}_4\text{(s)} + 2 \text{NaCl(aq)}$
3. $\text{H}_2\text{SO}_4\text{(aq)} + 2 \text{NaOH(aq)} \rightarrow \text{Na}_2\text{SO}_4\text{(aq)} + 2 \text{H}_2\text{O(l)}$

- A) 2 and 3 only
- B) 1 and 2 only
- C) 1 and 3 only
- D) All of 1, 2, and 3
- E) None of 1, 2, and 3

End of Chapter Questions

Question 19

Explain what happens to an ionic substance when it dissolves in water.

Question 20

Do polyatomic ions dissociate when they dissolve in water, or do they remain intact?

Question 21

Is the precipitate in a precipitation reaction always a compound that is soluble or insoluble? Explain.

Question 22

What is an acid–base reaction? List an example and identify the acid and the base.

Question 23

What is a combustion reaction? Give an example.

Question 24

Explain the difference between a synthesis reaction and a decomposition reaction and provide an example of each.

Question 25

Explain the difference between a single-displacement reaction and a double-displacement reaction and provide an example of each.

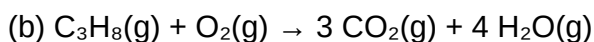
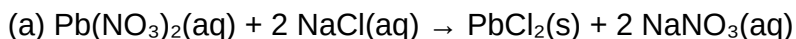
Question 26

Which observations are consistent with a chemical reaction occurring? Why?

- (a) Solid copper deposits on aluminum foil placed in a blue copper nitrate solution, and the solution color fades.
- (b) Liquid ethyl alcohol turns into a solid in a low-temperature freezer.
- (c) A white precipitate forms when solutions of barium nitrate and sodium sulfate are mixed.
- (d) A sugar-and-water mixture bubbles when yeast is added; after several days the sugar is gone and ethyl alcohol is present.

Question 27

For each equation, list the number of each type of atom on each side and determine whether the equation is balanced.



Question 28

Write a balanced chemical equation for each reaction.

- (a) Solid lead(II) sulfide reacts with aqueous hydrochloric acid to form solid lead(II) chloride and dihydrogen sulfide gas.
- (b) Gaseous carbon monoxide reacts with hydrogen gas to form gaseous methane and liquid water.
- (c) Solid iron(III) oxide reacts with hydrogen gas to form solid iron and liquid water.
- (d) Gaseous ammonia reacts with gaseous oxygen to form gaseous nitrogen monoxide and gaseous water.

Question 29

Write a balanced chemical equation for each reaction.

- (a) Gaseous acetylene, C_2H_2 , reacts with oxygen gas to form gaseous carbon dioxide and gaseous water.
- (b) Chlorine gas reacts with aqueous potassium iodide to form solid iodine and aqueous potassium chloride.
- (c) Solid lithium oxide reacts with liquid water to form aqueous lithium hydroxide.
- (d) Gaseous carbon monoxide reacts with oxygen gas to form carbon dioxide gas.

Question 30

Balance each chemical equation.

- (a) $Na_2S(aq) + Cu(NO_3)_2(aq) \rightarrow NaNO_3(aq) + CuS(s)$
- (b) $HCl(aq) + O_2(g) \rightarrow H_2O(l) + Cl_2(g)$
- (c) $H_2(g) + O_2(g) \rightarrow H_2O(l)$
- (d) $FeS(s) + HCl(aq) \rightarrow FeCl_2(aq) + H_2S(g)$

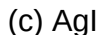
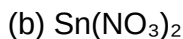
Question 31

Balance each chemical equation.

- (a) $BaO_2(s) + H_2SO_4(aq) \rightarrow BaSO_4(s) + H_2O_2(aq)$
- (b) $Co(NO_3)_3(aq) + (NH_4)_2S(aq) \rightarrow Co_2S_3(s) + NH_4NO_3(aq)$
- (c) $Li_2O(s) + H_2O(l) \rightarrow LiOH(aq)$
- (d) $Hg_2(C_2H_3O_2)_2(aq) + KCl(aq) \rightarrow Hg_2Cl_2(s) + KC_2H_3O_2(aq)$

Question 32

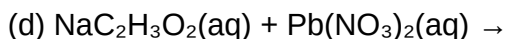
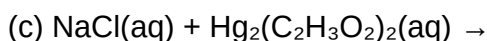
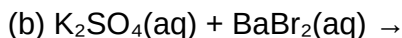
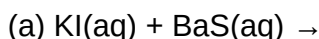
Is each compound soluble or insoluble? For soluble compounds, identify the ions present in solution.

**Question 33**

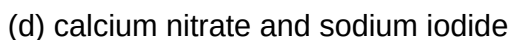
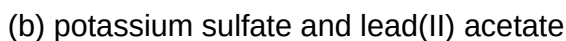
Pair each cation with an anion that forms an insoluble compound and write the formula of that compound. Use each anion only once. Cations: Ag^+ , Ba^{2+} , Cu^{2+} , Fe^{3+} . Anions: SO_4^{2-} , Cl^- , CO_3^{2-} , S^{2-} .

Question 34

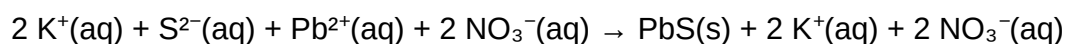
Complete and balance each equation. If no reaction occurs, write NO REACTION.

**Question 35**

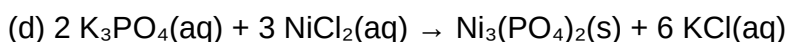
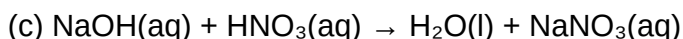
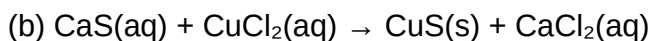
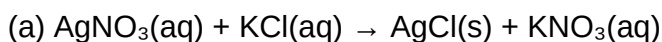
Write a molecular equation for the precipitation reaction, if any, when each pair of solutions is mixed. If no reaction occurs, write NO REACTION.

**Question 36**

Identify the spectator ions in this complete ionic equation.

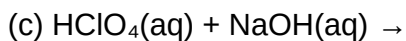
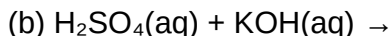
**Question 37**

Write balanced complete ionic and net ionic equations for each reaction.

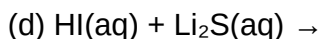
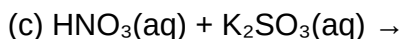
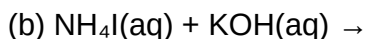
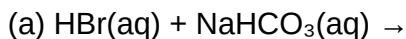


Question 38

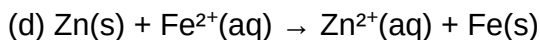
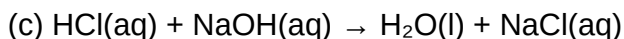
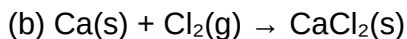
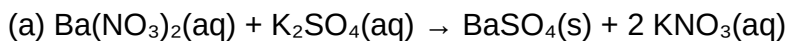
Complete and balance each acid–base reaction.

**Question 39**

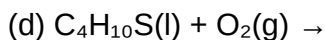
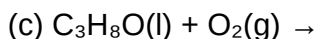
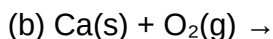
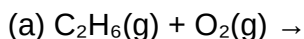
Complete and balance each gas evolution reaction.

**Question 40**

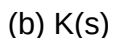
Which reactions are redox reactions?

**Question 41**

Complete and balance each combustion reaction.

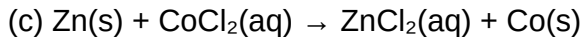
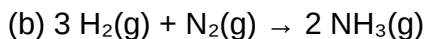
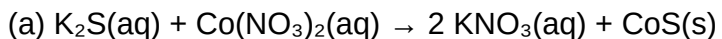
**Question 42**

Write a balanced chemical equation for the synthesis reaction of $\text{Br}_2\text{(g)}$ with each metal.

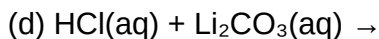
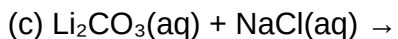
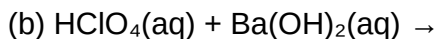
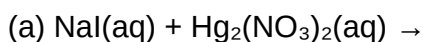


Question 43

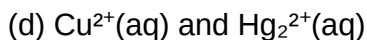
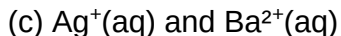
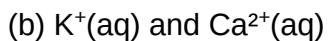
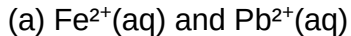
Classify each reaction as synthesis, decomposition, single displacement, or double displacement.

**Question 44**

Predict the products and write balanced complete ionic and net ionic equations. If no reaction occurs, write NO REACTION.

**Question 45**

What solution can you add to each cation mixture to precipitate one cation while keeping the other in solution? Write a net ionic equation for the precipitation reaction.

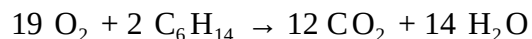


Solutions

Find the solution with the same question number.

Question 1 Solution

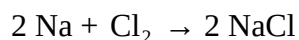
B. Balance carbon first, then hydrogen, then oxygen. One C_6H_{14} gives 6 CO_2 and 7 H_2O , requiring $19/2 \text{ O}_2$. Multiply every coefficient by 2.



The smallest whole-number coefficient of O_2 is 19.

Question 2 Solution

B. Sodium loses electrons and chlorine gains them.



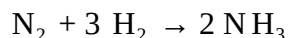
This is an oxidation–reduction reaction; it is also a synthesis reaction.

Question 3 Solution

C. Reaction with oxygen that releases heat and forms oxygen-containing products is combustion.

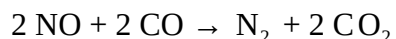
Question 4 Solution

C. First balance nitrogen with 2 NH_3 ; this requires 6 H atoms, supplied by 3 H_2 .



Question 5 Solution

C. Write correct formulas before balancing. Nitrogen is N_2 .



The coefficients in the requested order are 2, 2, 1, 2.

Question 6 Solution

B. $\text{Mg}_3(\text{PO}_4)_2$ is insoluble by the phosphate rule. The magnesium iodide, nitrate, and sulfate listed are soluble.

Question 7 Solution

C. $\text{Al}_2(\text{SO}_4)_3$ is soluble. The hydroxide, sulfide, and carbonate are classified as insoluble under the course solubility rules.

Question 8 Solution

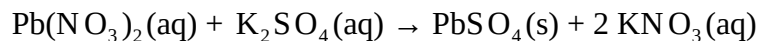
C. Dissolved NaCl dissociates into Na^+ and Cl^- , which carry charge through the solution. The statement that it fails to dissociate is false. The taste statement describes a property; do not taste laboratory chemicals.

Question 9 Solution

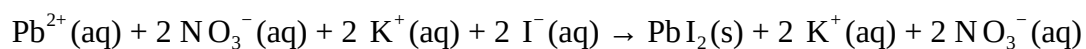
B. AgCl and PbCl₂ can precipitate, while KCl remains soluble. Thus two different solids are possible.

Question 10 Solution

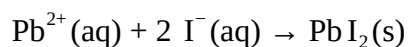
B. Exchange the ion partners and apply the solubility rules. PbSO₄ is insoluble; KNO₃ remains dissolved.

**Question 11 Solution**

D. Split dissolved strong electrolytes into ions, retain their coefficients, and leave the precipitate intact.

**Question 12 Solution**

A. Cancel K⁺ and NO₃⁻ because they appear unchanged on both sides.



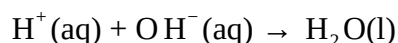
There are two iodine atoms and zero net charge on each side.

Question 13 Solution

D. K⁺ is unchanged on both sides, so it is a spectator ion. NO₃⁻ is also a spectator, but it is not one of the answer choices.

Question 14 Solution

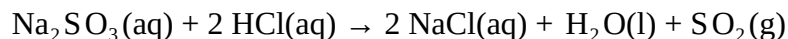
B. HCl and KOH are strong electrolytes. K⁺ and Cl⁻ cancel.

**Question 15 Solution**

C. Hydroxide reacts with acid to make water. Carbonate, sulfide, and bisulfite can give CO₂, H₂S, and SO₂, respectively.

Question 16 Solution

D. Acid converts sulfite into sulfurous acid, which decomposes to sulfur dioxide and water. Hydrogen gas is not produced.

**Question 17 Solution**

A. Oxidation and reduction occur together: electrons lost by one species are gained by another.

Question 18 Solution

D. In all three equations, the positive and negative ion partners exchange. The first two form precipitates; the third is an acid–base neutralization.

Question 19 Solution

The ions separate from the crystal and become surrounded by water molecules. The solution contains hydrated cations and anions, not intact neutral “molecules” of the ionic compound. For example, NaCl dissolves to give $\text{Na}^+(\text{aq})$ and $\text{Cl}^-(\text{aq})$.

Question 20 Solution

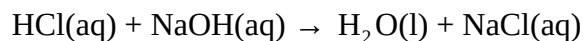
In ordinary dissolution, the polyatomic ion stays intact while separating from its counterions. For example, NaNO_3 gives Na^+ and NO_3^- ; the nitrate ion does not separate into individual nitrogen and oxygen atoms or ions.

Question 21 Solution

It is insoluble under the conditions of the reaction. The solid forms because its ions cannot remain completely dissolved at the concentrations present. “Insoluble” in the course rules means very low solubility, not literally zero dissolved material.

Question 22 Solution

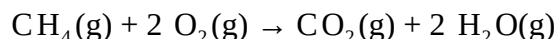
In the neutralization reactions considered here, an acid reacts with a base to produce water and a salt.



HCl is the acid and NaOH is the base. The net change is $\text{H}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O}$.

Question 23 Solution

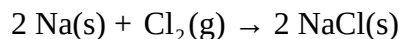
A combustion reaction is a reaction with oxygen that releases energy and forms oxygen-containing products. For example:



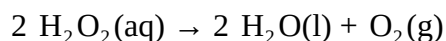
Carbon forms CO_2 and hydrogen forms H_2O during complete combustion of methane.

Question 24 Solution

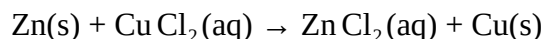
Synthesis combines simpler substances into one compound.



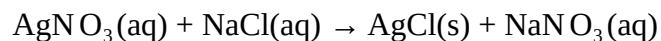
Decomposition breaks a compound into simpler substances.

**Question 25 Solution**

In single displacement, an element replaces another element in a compound.



In double displacement, two compounds exchange ion partners.



Question 26 Solution

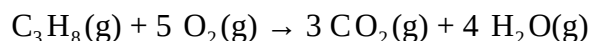
(a), (c), and (d) show formation of new substances and are consistent with chemical reactions. In (a), copper ions become copper metal; in (c), an insoluble compound forms; in (d), fermentation forms ethanol and a gas.

(b) is a physical phase change: solid and liquid ethanol have the same molecular identity. Bubbles alone would not establish a chemical reaction, but the product information in (d) does.

Question 27 Solution

(a) Left and right each contain Pb: 1; N: 2; O: 6; Na: 2; Cl: 2. The equation is balanced.

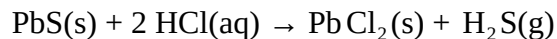
(b) Left: C: 3; H: 8; O: 2. Right: C: 3; H: 8; O: 10. It is not balanced. Changing the O_2 coefficient to 5 balances it.



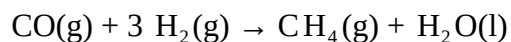
Question 28 Solution

Write the formulas first, then change coefficients only. The phases below follow the question.

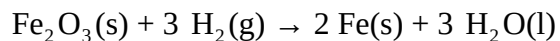
(a)



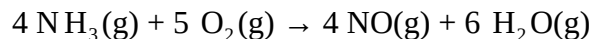
(b)



(c)



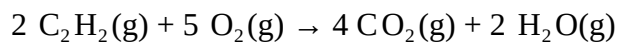
(d)



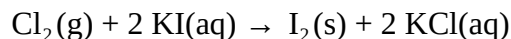
For (d), balance N and H first: 4NH_3 gives 4NO and $6 \text{H}_2\text{O}$. These products contain 10 oxygen atoms, requiring 5O_2 .

Question 29 Solution

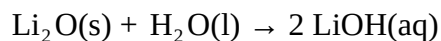
(a) Balance C and H, then clear the fractional O_2 coefficient.



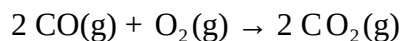
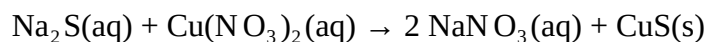
(b) Remember that free chlorine and iodine are diatomic.



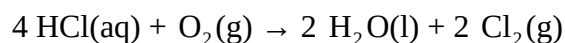
(c)



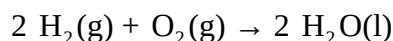
(d)

**Question 30 Solution**(a) The two nitrate groups remain intact, and two Na atoms require 2 NaNO₃.

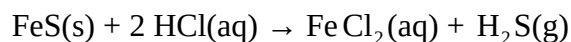
(b)



(c)

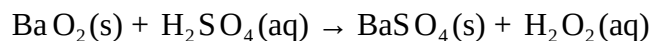


(d)

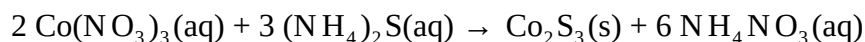
**Question 31 Solution**

Keep a polyatomic group together during balancing when it is unchanged on both sides.

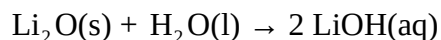
(a) Already balanced, with all coefficients 1.



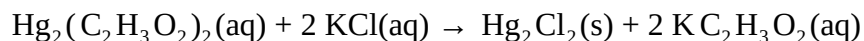
(b)



(c)



(d)

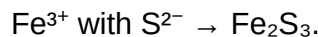
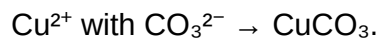
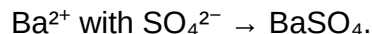
**Question 32 Solution**(a) Soluble: Na⁺ and C₂H₃O₂⁻, in a 1:1 ratio. Both the sodium and acetate rules predict solubility.(b) Soluble: Sn²⁺ and NO₃⁻, in a 1:2 ratio. Nitrates are soluble.

(c) Insoluble: AgI is a halide exception.

(d) Soluble: Na⁺ and PO₄³⁻, in a 3:1 ratio. The sodium rule takes priority over the general insolubility of phosphates.

Question 33 Solution

One pairing satisfying the course solubility rules is:



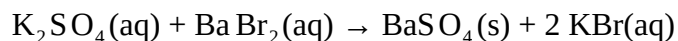
In the last formula, two +3 ions balance three -2 ions. These formulas apply the introductory precipitation model requested in the question.

Question 34 Solution

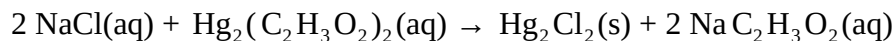
Test the possible new ion pairs for an insoluble product.

(a) NO REACTION. BaI_2 and K_2S are soluble.

(b)



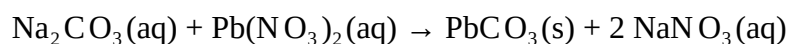
(c)



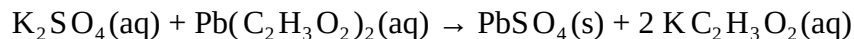
(d) NO REACTION. Sodium nitrate and lead(II) acetate are soluble. Merely exchanging partners on paper does not establish a reaction.

Question 35 Solution

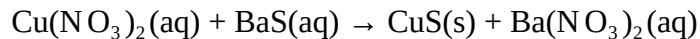
(a) Lead(II) carbonate precipitates.



(b) Lead(II) sulfate precipitates.



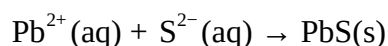
(c) Copper(II) sulfide precipitates.



(d) NO REACTION. Calcium iodide and sodium nitrate are soluble.

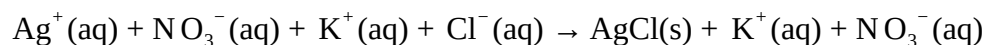
Question 36 Solution

K^+ and NO_3^- are spectator ions because they appear unchanged on both sides. After canceling them:

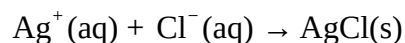
**Question 37 Solution**

Split aqueous strong electrolytes into ions. Leave solids and liquid water intact, then cancel the unchanged ions.

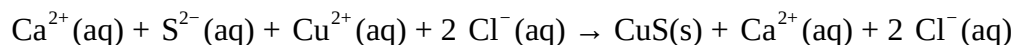
(a) Complete ionic:



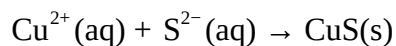
Net ionic:



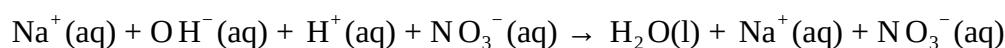
(b) Complete ionic:



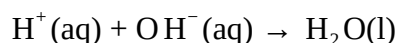
Net ionic:



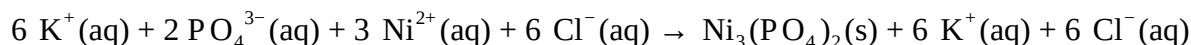
(c) Complete ionic:



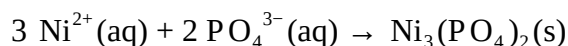
Net ionic:



(d) Complete ionic:

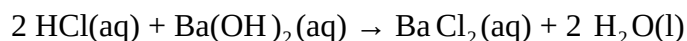


Net ionic:

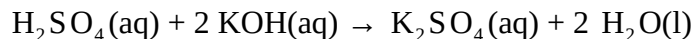
**Question 38 Solution**

Balance the acid's H^+ with the base's OH^- to form water, and combine the remaining ions into the salt.

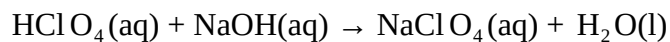
(a)



(b)

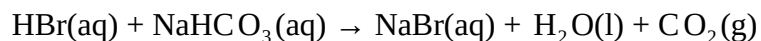


(c)

**Question 39 Solution**

Identify the gas-producing ion pair. Bicarbonate with acid gives CO_2 and water; ammonium with hydroxide gives NH_3 and water; sulfite with acid gives SO_2 and water; sulfide with acid gives H_2S .

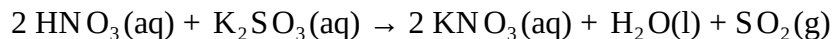
(a)



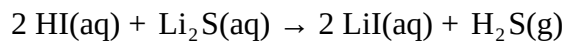
(b)



(c)



(d)

**Question 40 Solution**

(b) and (d) are redox reactions.

In (b), Ca loses two electrons to become Ca^{2+} , and chlorine gains electrons to become Cl^- .

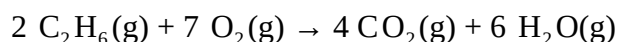
In (d), Zn loses two electrons and Fe^{2+} gains two electrons.

(a) is precipitation and (c) is neutralization; neither involves electron transfer between the reacting species.

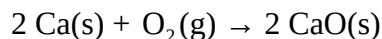
Question 41 Solution

For complete combustion, carbon forms CO_2 , hydrogen forms H_2O , and the sulfur in (d) is taken to form SO_2 . Balance oxygen last, including oxygen already in the fuel.

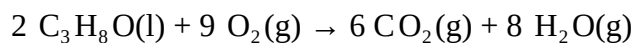
(a)



(b)



(c) One fuel molecule gives 3 CO_2 and 4 H_2O , requiring 10 product oxygen atoms. One is already in the fuel, so 9 must come from O_2 .

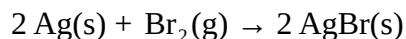


(d)

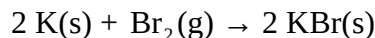
**Question 42 Solution**

First form an electrically neutral metal bromide, then balance with diatomic bromine.

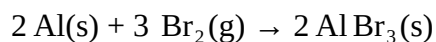
(a)



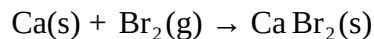
(b)



(c)



(d)

**Question 43 Solution**

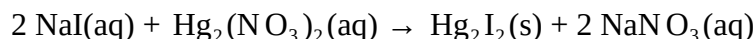
(a) Double displacement: cations exchange anion partners.

(b) Synthesis: two elements combine into a compound.

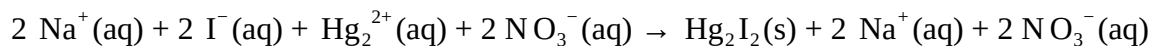
(c) Single displacement: Zn replaces Co in the compound.

(d) Decomposition: one species breaks into two species. The CH_3 and Br products are radicals, often written $\text{CH}_3\bullet$ and $\text{Br}\bullet$.**Question 44 Solution**(a) Mercury(I) iodide precipitates. The mercury(I) ion is Hg_2^{2+} ; keep that ion intact.

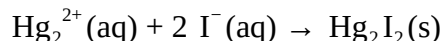
Molecular:



Complete ionic:

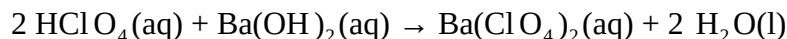


Net ionic:

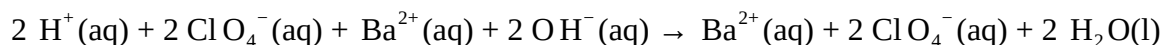


(b) Neutralization forms water and soluble barium perchlorate.

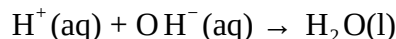
Molecular:



Complete ionic:



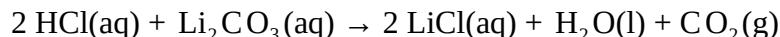
Net ionic, reduced to the smallest ratio:



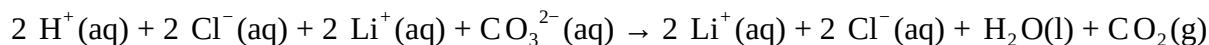
(c) NO REACTION. Under the course solubility rules, the possible products stay dissolved; every ion cancels.

(d) Acid plus carbonate releases carbon dioxide.

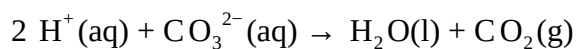
Molecular:



Complete ionic:

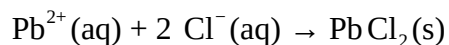


Net ionic:

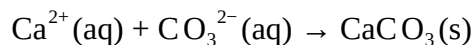
**Question 45 Solution**

Choose an anion that forms an insoluble compound with only one of the two cations, using the course solubility rules.

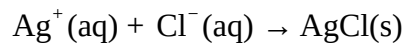
(a) Add $\text{NaCl}(\text{aq})$. PbCl_2 precipitates; Fe^{2+} stays dissolved.



(b) Add $\text{Na}_2\text{CO}_3(\text{aq})$. CaCO_3 precipitates; K^+ stays dissolved.



(c) Add $\text{NaCl}(\text{aq})$. AgCl precipitates; Ba^{2+} stays dissolved.



(d) Add $\text{NaCl}(\text{aq})$. Hg_2Cl_2 precipitates; Cu^{2+} stays dissolved.

