CHEMISTRY MCQ BOOKLET

Grade 9 · Chapter 18 · Qualitative Analysis

FBISE / National Book Foundation Model Textbook companion

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Independent MCQs on qualitative analysis, gas tests, and flame tests. Not copied from the book exercise. Total: 108 questions. Each item has four options, the correct letter, and a teaching explanation.

A. Important / Main Topics

1. Qualitative analysis is mainly used to determine:

(A) the identity or nature of a substance
(B) how much substance is present
(C) the cost of a sample
(D) the mass of every atom

Correct Answer: A

Explanation: Qualitative analysis identifies what a substance is rather than measuring how much is present.

2. Which question belongs to quantitative analysis?

(A) Is chloride present?
(B) How many grams of salt are present?
(C) What gas relights a splint?
(D) Which ion gives a green flame?

Correct Answer: B

Explanation: Quantitative analysis answers numerical questions such as the mass or concentration of a substance.

3. A test that establishes the identity of a suspected substance is called a:

(A) heating error
(B) mass measurement
(C) confirmatory test
(D) dilution step

Correct Answer: C

Explanation: A confirmatory test gives characteristic evidence that supports the proposed identity of a substance.

4. An observation that only suggests a possible identity is best described as:

(A) a quantitative result
(B) an exact concentration
(C) a balanced equation
(D) a preliminary indication

Correct Answer: D

Explanation: An observation that only suggests a possible identity is best described as a preliminary indication.

5. Which result is qualitative?

(A) The flame is golden yellow
(B) The solution has a pH of exactly 9.20
(C) The sample contains 2.4 g of zinc
(D) The gas volume is 35 cm³

Correct Answer: A

Explanation: The flame is golden yellow — this correctly answers the question.

6. Ammonia gas is classified as basic because its aqueous effect gives:

(A) pH below 7
(B) pH above 7
(C) pH equal to 7 only
(D) no effect on indicators

Correct Answer: B

Explanation: Dissolved ammonia produces an alkaline solution, so its pH is greater than seven.

7. The characteristic litmus test for ammonia uses:

(A) dry blue litmus
(B) dry red litmus only
(C) moist red litmus
(D) moist blue litmus

Correct Answer: C

Explanation: Moist red litmus turns blue because ammonia must dissolve in water before showing basic behaviour.

8. Why is damp litmus used when testing ammonia gas?

(A) Water makes ammonia acidic
(B) Dry paper always turns blue first
(C) Water removes all ammonia
(D) Water lets the gas dissolve and affect the indicator

Correct Answer: D

Explanation: The moisture dissolves ammonia so hydroxide-producing basic behaviour can change the indicator colour.

9. A gas turns moist red litmus paper blue. The strongest identification is:

(A) ammonia
(B) carbon dioxide
(C) chlorine
(D) sulfur dioxide

Correct Answer: A

Explanation: Ammonia is a basic gas and characteristically changes moist red litmus paper to blue.

10. Which change would NOT confirm ammonia?

(A) moist red litmus becomes blue
(B) glowing splint relights
(C) the gas shows basic behaviour
(D) aqueous pH rises above 7

Correct Answer: B

Explanation: Relighting a glowing splint is the characteristic test for oxygen rather than ammonia.

11. The reactants used to manufacture ammonia in the Haber process are:

(A) hydrogen and oxygen
(B) nitrogen and chlorine
(C) hydrogen and nitrogen
(D) carbon dioxide and water

Correct Answer: C

Explanation: The Haber process combines nitrogen with hydrogen to form ammonia under controlled industrial conditions.

12. Which word equation represents the Haber process?

(A) nitrogen + oxygen → ammonia
(B) ammonia + oxygen → nitrogen
(C) hydrogen + chlorine → ammonia
(D) nitrogen + hydrogen → ammonia

Correct Answer: D

Explanation: Ammonia is formed industrially by combining nitrogen gas with hydrogen gas.

13. A major agricultural product made using ammonia is:

(A) urea fertilizer
(B) marble

(C) limewater
(D) copper wire

Correct Answer: A

Explanation: Ammonia supplies nitrogen for manufacturing urea, an important nitrogen-containing fertilizer.

14. A student tests a gas with dry red litmus and sees no change. Why is the ammonia conclusion uncertain?

(A) Ammonia always turns red litmus white
(B) Dry litmus lacks moisture needed for the test
(C) Ammonia is never soluble in water
(D) Red litmus detects oxygen only

Correct Answer: B

Explanation: Without moisture, ammonia cannot dissolve sufficiently to produce the alkaline conditions that turn red litmus blue.

15. Which pair correctly links ammonia with its property and use?

(A) acidic; bleaching paper
(B) neutral; relights splints
(C) basic; manufacture of urea
(D) oxidizing; makes limewater milky

Correct Answer: C

Explanation: Ammonia is basic and is an important nitrogen source in the manufacture of urea fertilizer.

16. Carbon dioxide can be prepared in the laboratory by reacting hydrochloric acid with:

(A) zinc metal
(B) hydrogen peroxide
(C) potassium chloride
(D) marble chips

Correct Answer: D

Explanation: Marble chips contain calcium carbonate, which releases carbon dioxide when treated with hydrochloric acid.

17. The chemical formula of marble chips used for preparing carbon dioxide is:

(A) $CaCO_3$
(B) $CaCl_2$
(C) $Ca(OH)_2$
(D) CaO_2

Correct Answer: A

Explanation: Marble is mainly calcium carbonate, $CaCO_3$, which reacts with acid to release carbon dioxide.

18. In $CaCO_3 + 2HCl \rightarrow CaCl_2 + CO_2 + H_2O$, the gas formed is:

(A) chlorine
(B) carbon dioxide
(C) oxygen
(D) hydrogen

Correct Answer: B

Explanation: Acid reacting with a carbonate produces a salt, carbon dioxide, and water.

19. The salt produced when marble chips react with hydrochloric acid is:

(A) calcium sulfate
(B) sodium chloride
(C) calcium chloride
(D) zinc chloride

Correct Answer: C

Explanation: Calcium carbonate and hydrochloric acid form calcium chloride along with carbon dioxide and water.

20. The standard confirmatory reagent for carbon dioxide is:

(A) acidified potassium manganate(VII)
(B) moist red litmus
(C) a glowing splint
(D) limewater

Correct Answer: D

Explanation: The standard confirmatory reagent for carbon dioxide is limewater.

21. Limewater is an aqueous solution of:

(A) calcium hydroxide
(B) calcium carbonate
(C) calcium chloride
(D) calcium sulfate

Correct Answer: A

Explanation: Limewater is a clear, dilute aqueous solution of calcium hydroxide, Ca(OH)□.

22. When carbon dioxide is bubbled through limewater, the milky solid is:

(A) calcium chloride
(B) calcium carbonate
(C) carbon powder
(D) calcium metal

Correct Answer: B

Explanation: Carbon dioxide reacts with calcium hydroxide to precipitate insoluble calcium carbonate.

23. Which equation represents the limewater test?

(A) CO□ + H□O → H□ + O□
(B) CaCO□ → Ca + CO□
(C) CO□ + Ca(OH)□ → CaCO□ + H□O
(D) CO□ + CaCl□ → Cl□ + CaO

Correct Answer: C

Explanation: The limewater test forms insoluble calcium carbonate and water from carbon dioxide and calcium hydroxide.

24. The word 'milky' in the carbon dioxide test indicates:

(A) a colourless gas escaped
(B) the solution became strongly basic
(C) calcium metal was formed
(D) an insoluble solid is suspended

Correct Answer: D

Explanation: Milkiness is caused by fine particles of insoluble calcium carbonate suspended in the liquid.

25. A clear liquid becomes cloudy when an unknown gas is bubbled through it. If the liquid was limewater, the gas is probably:

(A) carbon dioxide
(B) hydrogen
(C) oxygen
(D) ammonia

Correct Answer: A

Explanation: A clear liquid becomes cloudy when an unknown gas is bubbled through it. If the liquid was limewater, the gas is probably carbon dioxide.

26. Which observation distinguishes carbon dioxide from oxygen most directly?

(A) it is a gas
(B) it turns limewater milky
(C) it occupies space

(D) it can be collected

Correct Answer: B

Explanation: Turning limewater milky is a characteristic chemical test for carbon dioxide.

27. Chlorine first changes damp blue litmus to:

(A) green
(B) yellow
(C) red
(D) black

Correct Answer: C

Explanation: Chlorine forms acidic substances in moisture, so blue litmus first changes to red.

28. After turning damp blue litmus red, chlorine then:

(A) turns it blue again
(B) makes it milky
(C) produces a pop
(D) bleaches it white

Correct Answer: D

Explanation: After turning damp blue litmus red, chlorine then bleaches it white.

29. The complete litmus observation for chlorine is:

(A) blue to red and then white
(B) red to blue only
(C) white to green
(D) blue remains unchanged

Correct Answer: A

Explanation: Damp blue litmus first records acidity by turning red and is then bleached white.

30. Why must litmus be damp in the chlorine test?

(A) Dry chlorine is always basic
(B) Moisture allows chlorine chemistry that causes acidity and bleaching
(C) Water changes chlorine into oxygen only
(D) Moisture prevents every colour change

Correct Answer: B

Explanation: Water on the paper enables chlorine to form reactive species responsible for the observed changes.

31. A practical use of chlorine linked to its test behaviour is as a:

(A) fertilizer metal
(B) limewater indicator
(C) bleaching agent
(D) hydrogen fuel

Correct Answer: C

Explanation: Chlorine removes colours through bleaching reactions, which explains its use as a bleaching agent.

32. An unknown gas turns damp blue litmus red but does not yet bleach it. Why should observation continue?

(A) Oxygen always turns it white later
(B) Hydrogen makes red litmus blue
(C) Carbon dioxide produces a pop
(D) Chlorine bleaching may follow the initial acidic change

Correct Answer: D

Explanation: The sequential red-then-white change is more diagnostic of chlorine than the first acidic change alone.

33. Which test paper is most suitable for showing both stages of the chlorine test?

(A) damp blue litmus
(B) dry red litmus

(C) dry white paper
(D) damp red litmus only

Correct Answer: A

Explanation: Damp blue litmus — this correctly answers the question.

34. Hydrogen can be generated by reacting dilute sulfuric acid with:

(A) calcium carbonate
(B) zinc
(C) limewater
(D) sodium chloride

Correct Answer: B

Explanation: Zinc displaces hydrogen from dilute sulfuric acid, producing zinc sulfate and hydrogen gas.

35. Which equation correctly represents laboratory preparation of hydrogen?

(A) Zn + O□ → ZnSO□
(B) ZnSO□ + H□ → Zn + H□SO□
(C) Zn + H□SO□ → ZnSO□ + H□
(D) H□SO□ → H□ + S + O□

Correct Answer: C

Explanation: Zinc reacts with dilute sulfuric acid to form zinc sulfate while hydrogen gas is released.

36. In the zinc–sulfuric acid reaction, the dissolved salt is:

(A) zinc chloride
(B) calcium sulfate
(C) sodium sulfate
(D) zinc sulfate

Correct Answer: D

Explanation: The sulfate ion combines with zinc ions to produce zinc sulfate in solution.

37. Hydrogen is often collected in an inverted test tube because hydrogen is:

(A) less dense than air
(B) denser than every liquid
(C) a heavy solid
(D) highly soluble limestone

Correct Answer: A

Explanation: Hydrogen rises because it is less dense than air, so an inverted vessel can retain it.

38. The confirmatory splint test for hydrogen uses a:

(A) glowing splint
(B) burning splint
(C) wet glass rod
(D) cold metal loop

Correct Answer: B

Explanation: The confirmatory splint test for hydrogen uses a burning splint.

39. A 'pop' when a burning splint approaches a gas indicates:

(A) oxygen
(B) carbon dioxide
(C) hydrogen
(D) ammonia

Correct Answer: C

Explanation: Hydrogen rapidly burns with oxygen near the flame, producing a characteristic pop.

40. The pop in the hydrogen test results from rapid formation of:

(A) limewater
(B) ammonia

(C) zinc sulfate crystals only
(D) water

Correct Answer: D

Explanation: Hydrogen reacts rapidly with oxygen during ignition and forms water while releasing energy.

41. Which balanced equation describes burning hydrogen?

(A) 2H□ + O□ → 2H□O
(B) H□ + O□ → H□O
(C) H□ + 2O□ → H□O□
(D) 2H□ + 2O□ → H□O

Correct Answer: A

Explanation: Two hydrogen molecules react with one oxygen molecule to form two water molecules.

42. A student uses a glowing splint on hydrogen. What procedural correction is needed?

(A) Add limewater and look for milkiness
(B) Use a burning splint to listen for a pop
(C) Use dry blue litmus
(D) Use platinum wire

Correct Answer: B

Explanation: Hydrogen is identified with a burning splint, whereas a glowing splint is used for oxygen.

43. Why should the first small portion of gas from a hydrogen apparatus be treated cautiously?

(A) It must be pure oxygen
(B) It always contains solid zinc
(C) It may contain air that can form an explosive mixture
(D) It cannot burn under any condition

Correct Answer: C

Explanation: Air initially present in the apparatus can mix with hydrogen and burn explosively near a flame.

44. Oxygen is confirmed by inserting a:

(A) burning splint that gives a pop
(B) damp blue litmus strip
(C) platinum loop
(D) glowing splint that relights

Correct Answer: D

Explanation: Oxygen is confirmed by inserting a glowing splint that relights.

45. The phrase 'supports combustion' means oxygen:

(A) helps another substance continue burning
(B) is always the fuel
(C) puts out every flame
(D) turns all indicators blue

Correct Answer: A

Explanation: Oxygen is usually not the fuel, but it allows combustible materials to burn more readily.

46. A glowing splint bursts back into flame in an unknown gas. The gas is:

(A) hydrogen
(B) oxygen
(C) carbon dioxide
(D) ammonia

Correct Answer: B

Explanation: Relighting a glowing splint is the standard confirmatory observation for oxygen.

47. Oxygen can be generated in the laboratory from the decomposition of:

(A) calcium chloride
(B) sodium metal only

(C) hydrogen peroxide
(D) urea fertilizer

Correct Answer: C

Explanation: Oxygen can be generated in the laboratory from the decomposition of hydrogen peroxide.

48. Which equation represents hydrogen peroxide decomposition?

(A) H□O□ → H□ + O□
(B) H□O + O□ → H□O□
(C) 2H□O□ → H□O + 2O□
(D) 2H□O□ → 2H□O + O□

Correct Answer: D

Explanation: 2H□O□ → 2H□O + O□ — this correctly answers the question.

49. Which statement correctly contrasts oxygen and hydrogen tests?

(A) Oxygen relights a glowing splint; hydrogen pops with a burning splint
(B) Both use damp litmus
(C) Hydrogen relights a glowing splint; oxygen bleaches litmus
(D) Both turn limewater milky

Correct Answer: A

Explanation: The splint condition and observation must be matched carefully to distinguish oxygen from hydrogen.

50. If a burning splint keeps burning more vigorously without a pop, the gas is more consistent with:

(A) hydrogen
(B) oxygen
(C) carbon dioxide
(D) chlorine

Correct Answer: B

Explanation: Oxygen supports vigorous combustion, while hydrogen is recognized by ignition with a pop.

51. Sulfur dioxide commonly acts as a:

(A) noble gas
(B) strong metal
(C) reducing agent
(D) flame-test wire

Correct Answer: C

Explanation: Sulfur dioxide can remove oxygen or donate electrons in reactions, so it behaves as a reducing agent.

52. The reagent used to test sulfur dioxide in this chapter is:

(A) limewater only
(B) moist red litmus only
(C) aqueous sodium chloride
(D) acidified potassium manganate(VII)

Correct Answer: D

Explanation: The reagent used to test sulfur dioxide in this chapter is acidified potassium manganate(VII).

53. The initial colour of acidified KMnO□ solution is:

(A) purple
(B) golden yellow
(C) milky white
(D) crimson red

Correct Answer: A

Explanation: The initial colour of acidified KMnO□ solution is purple.

54. A positive sulfur dioxide test with acidified KMnO□ gives:

(A) colourless becoming purple
(B) purple becoming colourless

(C) blue becoming red then white
(D) clear becoming milky

Correct Answer: B

Explanation: Sulfur dioxide reduces purple permanganate ions, so the solution is discharged or decolorized.

55. Why does sulfur dioxide decolorize acidified KMnO□?

(A) SO□ is a purple dye
(B) KMnO□ becomes calcium carbonate
(C) SO□ acts as a reducing agent
(D) SO□ relights a splint

Correct Answer: C

Explanation: Sulfur dioxide is oxidized while it reduces manganese in permanganate to a much less coloured state.

56. In an ionic description of the sulfur dioxide test, permanganate is reduced mainly to:

(A) solid calcium carbonate
(B) metallic potassium
(C) chlorine gas
(D) Mn^{2}□ in acidic solution

Correct Answer: D

Explanation: In acidic solution, purple permanganate ions are reduced to pale manganese(II) ions.

57. Which ionic equation is balanced for oxidation of SO□ by acidified permanganate?

(A) $2MnO_{4}^{-} + 5SO_{2} + 2H_{2}O \rightarrow 2Mn^{2+} + 5SO_{4}^{2-} + 4H^{+}$
(B) $MnO_{4}^{-} + SO_{2} \rightarrow Mn + S + O_{2}$
(C) $2KMnO_{4} + SO_{2} \rightarrow K_{2}SO_{4}$ only
(D) $SO_{2} + H_{2}O \rightarrow H_{2} + SO_{4}$

Correct Answer: A

Explanation: $2MnO_{4}^{-} + 5SO_{2} + 2H_{2}O \rightarrow 2Mn^{2+} + 5SO_{4}^{2-} + 4H^{+}$ — this correctly answers the question.

58. Which observation separates sulfur dioxide from carbon dioxide most clearly?

(A) both are gases
(B) SO□ discharges acidified KMnO□
(C) both can enter a test tube
(D) CO□ has a chemical formula

Correct Answer: B

Explanation: SO□ discharges acidified KMnO□ — this correctly answers the question.

59. A flame test is mainly a preliminary test for certain:

(A) non-metal gases only
(B) molecular masses
(C) metal ions
(D) liquid volumes

Correct Answer: C

Explanation: Many metal ions give characteristic flame colours that provide rapid preliminary identification.

60. The preferred wire for a traditional flame test is:

(A) plastic thread
(B) wooden splint
(C) iron nail covered in rust
(D) platinum wire

Correct Answer: D

Explanation: The preferred wire for a traditional flame test is platinum wire.

61. The loop is cleaned between flame tests primarily to:

(A) prevent contamination from the previous ion
(B) increase the sample mass

(C) make the flame colder
(D) produce carbon dioxide

Correct Answer: A

Explanation: Residual salts can add their own colours and cause a false or confusing flame observation.

62. A clean flame-test loop should give:

(A) a strong persistent sodium yellow
(B) no significant flame colour before adding sample
(C) a crimson flame from platinum
(D) a milky precipitate

Correct Answer: B

Explanation: An uncontaminated loop should not introduce a colour that could be mistaken for the sample.

63. Heating a metal ion in a flame first causes its electrons to:

(A) turn into protons
(B) form calcium carbonate
(C) become excited to higher energy levels
(D) stop moving permanently

Correct Answer: C

Explanation: Flame energy promotes electrons from lower energy levels into excited higher-energy states.

64. Characteristic flame light is emitted when excited electrons:

(A) remain excited forever
(B) leave all atoms as neutrons
(C) react with limewater
(D) return to lower or ground energy states

Correct Answer: D

Explanation: Electrons release particular photon energies as they fall back to lower energy levels.

65. Different metal ions give different flame colours because they have:

(A) different allowed energy-level spacings
(B) identical electron structures
(C) the same emitted wavelengths
(D) no electrons

Correct Answer: A

Explanation: Each ion has characteristic energy gaps, so returning electrons emit a distinctive set of wavelengths.

66. The flame colour of sodium ions is:

(A) purple or lilac
(B) golden yellow
(C) green
(D) crimson red

Correct Answer: B

Explanation: The flame colour of sodium ions is golden yellow.

67. The flame colour of potassium ions is:

(A) golden yellow
(B) bluish green
(C) purple or lilac
(D) brick red

Correct Answer: C

Explanation: Potassium ions give a characteristic lilac or pale-purple flame when contamination is controlled.

68. The flame colour of lithium ions is:

(A) blue
(B) green

(C) golden yellow
(D) crimson red

Correct Answer: D

Explanation: The flame colour of lithium ions is crimson red.

69. The flame colour of strontium ions is:

(A) crimson red
(B) purple
(C) blue
(D) golden yellow

Correct Answer: A

Explanation: The flame colour of strontium ions is crimson red.

70. Which two ions can both produce crimson-red flame descriptions?

(A) sodium and barium
(B) lithium and strontium
(C) potassium and cesium
(D) copper and calcium

Correct Answer: B

Explanation: Lithium and strontium are both commonly described as giving crimson-red flame colours.

71. The flame colour of barium ions is:

(A) golden yellow
(B) crimson red
(C) green
(D) purple

Correct Answer: C

Explanation: The flame colour of barium ions is green.

72. Copper ions commonly give a flame that is:

(A) golden yellow
(B) crimson red
(C) pure white
(D) bluish green

Correct Answer: D

Explanation: Copper compounds commonly emit a distinctive bluish-green colour when heated in a flame.

73. Cesium ions are associated with which flame colour?

(A) blue
(B) green
(C) golden yellow
(D) crimson red

Correct Answer: A

Explanation: Blue — this correctly answers the question.

74. Calcium ions commonly produce a:

(A) blue flame
(B) brick-red or orange-red flame
(C) golden-yellow flame
(D) colourless flame only

Correct Answer: B

Explanation: Calcium ions commonly produce a brick-red or orange-red flame.

75. An intense golden-yellow colour hides a weaker lilac colour. The likely interfering ion is:

(A) potassium
(B) barium

(C) sodium
(D) copper

Correct Answer: C

Explanation: Sodium emission is very intense and can mask weaker flame colours from ions such as potassium.

76. Why is a flame test usually considered preliminary rather than absolute proof?

(A) Metal ions never emit light
(B) Every ion gives exactly the same colour
(C) Flames measure concentration exactly
(D) Several colours can be similar and contamination can interfere

Correct Answer: D

Explanation: Several colours can be similar and contamination can interfere — this correctly answers the question.

77. A sample gives a green flame. Which conclusion is most careful?

(A) Barium is suggested, but confirmation is advisable
(B) Only oxygen can be present
(C) The sample quantity is exactly one mole
(D) The sample must be pure copper

Correct Answer: A

Explanation: A green flame suggests barium in this scheme, but preliminary evidence should be confirmed independently.

78. A bluish-green flame most strongly suggests:

(A) sodium ions
(B) copper ions
(C) lithium ions
(D) cesium ions

Correct Answer: B

Explanation: Copper compounds are identified preliminarily by their characteristic bluish-green flame emission.

79. A student observes no sample colour before adding salt, then a purple flame. The likely ion is:

(A) sodium
(B) barium
(C) potassium
(D) strontium

Correct Answer: C

Explanation: A clean loop followed by a lilac or purple flame is consistent with potassium ions.

80. Which sequence is best for reliable flame testing?

(A) test, then clean only at the end
(B) add all samples together, then heat
(C) dip a wooden splint in limewater
(D) clean loop, add sample, heat, observe, clean again

Correct Answer: D

Explanation: Clean loop, add sample, heat, observe, clean again — this correctly answers the question.

B. Less Important / Secondary Topics

81. A gas has pH above 7 after dissolving and turns moist red litmus blue. Which property supports its identity?

(A) basic character of ammonia
(B) oxidizing character of oxygen
(C) acidity of chlorine
(D) precipitation by carbon dioxide

Correct Answer: A

Explanation: Both observations arise from the alkaline behaviour of dissolved ammonia in water.

82. Which test result identifies quantity rather than identity?

(A) limewater becomes milky
(B) a mass of 1.8 g is recorded
(C) a glowing splint relights
(D) a flame appears green

Correct Answer: B

Explanation: A numerical mass states how much material is present and is therefore quantitative.

83. Marble chips stop bubbling after enough acid is consumed. The bubbles formed during reaction were mainly:

(A) ammonia
(B) oxygen
(C) carbon dioxide
(D) chlorine

Correct Answer: C

Explanation: Marble chips stop bubbling after enough acid is consumed. The bubbles formed during reaction were mainly carbon dioxide.

84. If limewater remains clear, which conclusion is scientifically safest?

(A) Carbon dioxide is certainly present
(B) Hydrogen is certainly absent from the universe
(C) The reagent must be ammonia
(D) The test did not provide positive evidence for carbon dioxide

Correct Answer: D

Explanation: A negative result under those conditions does not support carbon dioxide and should be checked carefully.

85. Why is CaCO□ visible in the limewater test while Ca(OH)□ began as a clear solution?

(A) CaCO□ is insoluble and forms suspended particles
(B) CaCO□ is a blue gas
(C) Ca(OH)□ is metallic calcium
(D) Water becomes a solid metal

Correct Answer: A

Explanation: The newly formed calcium carbonate has low solubility and appears as a cloudy precipitate.

86. Which chlorine observation includes both acid behaviour and bleaching behaviour?

(A) red litmus turns blue only
(B) damp blue litmus turns red, then white
(C) limewater becomes milky
(D) a glowing splint relights

Correct Answer: B

Explanation: Damp blue litmus turns red, then white — this correctly answers the question.

87. A dry blue litmus strip changes poorly in chlorine. The best modification is to:

(A) replace it with platinum wire
(B) add marble chips to the paper
(C) moisten the paper
(D) weigh the paper only

Correct Answer: C

Explanation: Moisture enables the reactions that produce the characteristic red-then-bleached chlorine result.

88. Hydrogen collected by upward movement into an inverted tube demonstrates its:

(A) high solubility as limestone
(B) green flame colour

(C) ability to bleach litmus
(D) low density relative to air

Correct Answer: D

Explanation: The gas rises into the inverted vessel because hydrogen is much less dense than air.

89. Which pair would be confused if the type of splint were not stated?

(A) hydrogen and oxygen
(B) ammonia and sodium
(C) carbon dioxide and barium
(D) chlorine and calcium

Correct Answer: A

Explanation: Hydrogen needs a burning splint for a pop, while oxygen is tested with a glowing splint.

90. A test tube contains an unknown gas. A glowing splint relights, so the gas supports:

(A) limewater precipitation
(B) combustion
(C) litmus bleaching
(D) urea hydrolysis

Correct Answer: B

Explanation: Relighting demonstrates that oxygen supports the continued combustion of the splint.

91. Which substance is both the product of burning hydrogen and a product of the marble–acid reaction?

(A) chlorine
(B) ammonia
(C) water
(D) potassium manganate(VII)

Correct Answer: C

Explanation: Water forms in both hydrogen combustion and the reaction of calcium carbonate with hydrochloric acid.

92. In 2H□O□ → 2H□O + O□, two moles of peroxide yield how many moles of oxygen?

(A) two
(B) three
(C) four
(D) one

Correct Answer: D

Explanation: The balanced coefficients show that two moles of hydrogen peroxide produce one mole of oxygen.

93. A purple oxidizing solution becomes colourless when exposed to a gas. Which gas test is described?

(A) sulfur dioxide with acidified KMnO□
(B) oxygen with limewater
(C) hydrogen with litmus
(D) ammonia with a splint

Correct Answer: A

Explanation: Sulfur dioxide reduces acidified permanganate and therefore discharges its purple colour.

94. The sulfur atom in SO□ becomes sulfate during the permanganate reaction. This means SO□ is:

(A) reduced while acting as an oxidizing agent
(B) oxidized while acting as the reducing agent
(C) unchanged and inert
(D) converted into chlorine

Correct Answer: B

Explanation: The reducing agent is itself oxidized as sulfur moves to the higher oxidation state in sulfate.

95. Which safety-minded method avoids directly inhaling an unknown gas?

(A) Smell deeply from the test tube
(B) Taste a dissolved sample
(C) Use the specified indicator or reagent test
(D) Point the tube toward the face

Correct Answer: C

Explanation: Use the specified indicator or reagent test — this correctly answers the question.

96. A flame-test wire still gives yellow colour before sample is added. What should be done?

(A) Accept every next result as sodium
(B) Add all unknowns together
(C) Cool it in ink
(D) Clean and reheat it until the background colour disappears

Correct Answer: D

Explanation: Persistent background colour reveals contamination that must be removed before testing the unknown.

97. A red flame alone cannot always separate lithium from strontium because:

(A) both may be described as crimson red
(B) neither has electrons
(C) both are gases
(D) red light measures mass directly

Correct Answer: A

Explanation: Their similar crimson descriptions make a separate confirmatory test important for reliable identification.

98. Which flame observation is correctly paired with an ion?

(A) sodium—blue
(B) barium—green
(C) cesium—golden yellow
(D) potassium—crimson

Correct Answer: B

Explanation: Barium compounds characteristically produce a green flame in the listed qualitative tests.

99. Which flame observation is incorrectly paired?

(A) calcium—brick red
(B) copper—bluish green
(C) sodium—crimson red
(D) potassium—lilac

Correct Answer: C

Explanation: Sodium gives an intense golden-yellow flame rather than the crimson-red colour listed.

100. When electrons emit flame-test light, energy leaves mainly as:

(A) solid calcium carbonate
(B) hydrogen molecules
(C) drops of sulfuric acid
(D) photons of characteristic wavelengths

Correct Answer: D

Explanation: When electrons emit flame-test light, energy leaves mainly as photons of characteristic wavelengths.

101. A mixed sample gives only a strong yellow flame. Why may the result be incomplete?

(A) Sodium emission can mask colours from other ions
(B) Yellow proves every other ion is absent
(C) Platinum always produces sodium
(D) All mixtures are quantitative

Correct Answer: A

Explanation: The intense sodium line can dominate the visual observation even when other metal ions are present.

102. What is the main role of hydrochloric acid in the marble-chip preparation?

(A) It relights a glowing splint
(B) It supplies acid that reacts with carbonate to release CO□
(C) It gives potassium a lilac flame
(D) It converts oxygen into ammonia

Correct Answer: B

Explanation: Hydrogen ions from the acid react with carbonate, leading to carbon dioxide and water.

103. A gas turns damp blue litmus red but never bleaches it. Why is chlorine not fully confirmed?

(A) Chlorine must turn red litmus blue
(B) Chlorine always makes limewater milky
(C) The characteristic second-stage bleaching observation is missing
(D) Chlorine must produce a pop

Correct Answer: C

Explanation: Acidity alone is not unique, so the later bleaching step supplies more specific evidence.

104. Which apparatus choice follows from hydrogen being less dense than air?

(A) Keep the receiving tube upright and open below
(B) Collect it as a solid on filter paper
(C) Use a flame-test loop as the container
(D) Collect it in an inverted tube

Correct Answer: D

Explanation: An inverted receiving tube prevents rising hydrogen from escaping immediately upward.

105. A splint is glowing but has no flame. In oxygen it should:

(A) relight into a flame
(B) produce a squeaky pop only
(C) turn limewater milky
(D) bleach white instantly

Correct Answer: A

Explanation: Oxygen supports combustion and supplies enough oxidizer for the glowing wood to ignite again.

106. A student reports 'the gas is white' after limewater turns milky. What is the correction?

(A) Carbon dioxide itself becomes a white metal
(B) The suspended CaCO□ is white; the observation concerns the liquid mixture
(C) The gas changes into chlorine
(D) Limewater emits a purple flame

Correct Answer: B

Explanation: Milkiness comes from white calcium carbonate particles, not from carbon dioxide changing colour.

107. Which pairing gives a preliminary test followed by a possible independent confirmation?

(A) weighing followed by weighing again only
(B) adding every reagent at once
(C) flame colour followed by another ion-specific chemical test
(D) using a dirty loop twice

Correct Answer: C

Explanation: A flame colour suggests an ion, and a separate specific reaction can provide stronger confirmation.

108. Why should observations be recorded immediately during gas and flame tests?

(A) Every result becomes quantitative after one hour
(B) Recording creates the chemical reaction
(C) Delayed notes increase gas purity
(D) Some colour changes are sequential or brief and may otherwise be missed

Correct Answer: D

Explanation: Immediate recording preserves details such as chlorine's red-then-white sequence and transient flame colours.