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Chemistry Grade 10 — Chapter 7

Nitrogen, Sulphur and Metals

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Independent practice MCQs from the supplied Class 10 Chemistry notes pack. Total: 50 questions.

A. Important / Main Topics

1. What is a key component of photochemical smog formed by the reaction of NO and NO□ with unburned hydrocarbons?

(A) Peroxyacetyl nitrate (PAN)
(B) Sulfuric acid
(C) Carbon monoxide
(D) Ozone

Correct Answer: A

Explanation: Peroxyacetyl nitrate (PAN) is a key component of photochemical smog formed by the reaction of NO and NO□ with unburned hydrocarbons.

2. Which of the following is the balanced equation for the production of ammonia in the Haber process?

(A) N□□g□ + H□□g□ rightleftharpoons NH□□g□
(B) N□□g□ + 3H□□g□ rightleftharpoons 2NH□□g□
(C) N□□g□ + 2H□□g□ rightleftharpoons 2NH□□g□
(D) 2N□□g□ + 3H□□g□ rightleftharpoons 2NH□□g□

Correct Answer: B

Explanation: N□□g□ + 3H□□g□ rightleftharpoons 2NH□□g□ — this correctly answers the question.

3. What are the sources of hydrogen and nitrogen in the Haber process?

(A) Water and air
(B) Methane and water
(C) Methane and air
(D) Water and methane

Correct Answer: C

Explanation: Hydrogen is obtained from methane and nitrogen from air.

4. Which catalyst is used in the Haber process?

(A) Platinum
(B) Vanadium(V) oxide
(C) Nickel
(D) Iron

Correct Answer: D

Explanation: Iron is used as a catalyst in the Haber process.

5. At what temperature is the Haber process typically conducted?

(A) 450^circ C
(B) 300^circ C
(C) 600^circ C
(D) 200^circ C

Correct Answer: A

Explanation: The Haber process is typically conducted at 450^circ C.

6. What is the symbol equation for the conversion of sulphur dioxide to sulphur trioxide in the Contact process?

(A) SO□□g□ + O□□g□ rightleftharpoons SO□□g□
(B) 2SO□□g□ + O□□g□ rightleftharpoons 2SO□□g□

(C) SO□□g□ + 2O□□g□ rightleftharpoons 2SO□□g□
(D) 2SO□□g□ + O□□g□ rightleftharpoons SO□□g□

Correct Answer: B

Explanation: 2SO□□g□ + O□□g□ rightleftharpoons 2SO□□g□ — this correctly answers the question.

7. Which catalyst is used in the Contact process for the conversion of SO□ to SO□?

(A) Iron
(B) Platinum
(C) Vanadium(V) oxide
(D) Nickel

Correct Answer: C

Explanation: Vanadium(V) oxide is used as a catalyst in the Contact process.

8. What are the sources of sulphur dioxide in the Contact process?

(A) Burning methane
(B) Electrolysis of water
(C) Combustion of natural gas
(D) Burning sulphur or roasting sulphide ores

Correct Answer: D

Explanation: Sulphur dioxide is produced by burning sulphur or roasting sulphide ores.

9. How do atmospheric oxides react with acids and bases?

(A) Forming a salt and water
(B) Forming an acid and a gas
(C) Forming a base and hydrogen
(D) Forming a salt and hydrogen

Correct Answer: A

Explanation: Atmospheric oxides react with acids and bases to form a salt and water.

10. Which of the following oxides is amphoteric?

(A) SO□
(B) Al□O□
(C) CO□
(D) CuO

Correct Answer: B

Explanation: Al□O□ — this correctly answers the question.

11. Which of the following is an acidic oxide?

(A) Na□O
(B) CaO
(C) CO□
(D) Al□O□

Correct Answer: C

Explanation: CO□ is an acidic oxide; it reacts with water to form carbonic acid.

12. Which of the following is a basic oxide?

(A) SO□
(B) CO□
(C) Al□O□
(D) CuO

Correct Answer: D

Explanation: CuO is a basic oxide; it reacts with acids to form salts and water.

13. Amphoteric oxides can react with:

(A) Both acids and bases
(B) Only acids

(C) Only bases
(D) Neither acids nor bases

Correct Answer: A

Explanation: Amphoteric oxides can react with both acids and bases.

14. Which of the following is an example of an amphoteric oxide?

(A) SO□
(B) ZnO
(C) CO□
(D) Na□O

Correct Answer: B

Explanation: ZnO is an amphoteric oxide; it reacts with both acids and bases.

15. Metals react with dilute acids to form:

(A) Salt and water
(B) Salt and carbon dioxide
(C) Salt and hydrogen gas
(D) Salt and oxygen

Correct Answer: C

Explanation: Metals react with dilute acids to form a salt and hydrogen gas.

16. Which of the following metals does NOT react with dilute acids?

(A) Magnesium
(B) Zinc
(C) Iron
(D) Copper

Correct Answer: D

Explanation: Copper does not react with dilute acids.

17. Reactive metals react with cold water to form:

(A) Metal hydroxide and hydrogen gas
(B) Metal oxide and hydrogen gas
(C) Metal hydroxide and oxygen gas
(D) Metal oxide and oxygen gas

Correct Answer: A

Explanation: Reactive metals react with cold water to form a metal hydroxide and hydrogen gas.

18. Which of the following metals reacts vigorously with cold water?

(A) Zinc
(B) Sodium
(C) Iron
(D) Copper

Correct Answer: B

Explanation: Sodium reacts vigorously with cold water.

19. Metals react with steam to form:

(A) Metal hydroxide and hydrogen gas
(B) Metal oxide and oxygen gas
(C) Metal oxide and hydrogen gas
(D) Metal hydroxide and oxygen gas

Correct Answer: C

Explanation: Metals react with steam to form a metal oxide and hydrogen gas.

20. Which of the following metals is unreactive?

(A) Potassium
(B) Sodium

(C) Calcium
(D) Gold

Correct Answer: D

Explanation: Gold — this correctly answers the question.

21. In the Contact process, the conversion of SO□ to SO□ is favoured by:

(A) High pressure and low temperature
(B) Low pressure and high temperature
(C) High pressure and high temperature
(D) Low pressure and low temperature

Correct Answer: A

Explanation: In the Contact process, the conversion of SO□ to SO□ is favoured by High pressure and low temperature.

22. The temperature used in the Contact process is:

(A) 200^circ C
(B) 450^circ C
(C) 300^circ C
(D) 600^circ C

Correct Answer: B

Explanation: The temperature used in the Contact process is 450^circ C.

23. Which of the following is an example of an acidic oxide?

(A) Na□O
(B) CaO
(C) SO□
(D) MgO

Correct Answer: C

Explanation: SO□ — this correctly answers the question.

24. Which of the following is an example of a basic oxide?

(A) CO□
(B) SO□
(C) Al□O□
(D) CaO

Correct Answer: D

Explanation: CaO — this correctly answers the question.

25. Which of the following metals is highly reactive?

(A) Potassium
(B) Copper
(C) Silver
(D) Gold

Correct Answer: A

Explanation: Potassium — this correctly answers the question.

B. Less Important / Secondary Topics

26. Which of the following is NOT a source of sulphur dioxide?

(A) Burning methane
(B) Burning sulphur
(C) Roasting sulphide ores
(D) Combustion of natural gas

Correct Answer: A

Explanation: Burning methane is not a source of sulphur dioxide.

27. Which of the following metals reacts vigorously with cold water?

(A) Zinc
(B) Sodium
(C) Iron
(D) Copper

Correct Answer: B

Explanation: Sodium reacts vigorously with cold water.

28. Which of the following is NOT a property of alkenes?

(A) They are unsaturated hydrocarbons
(B) They decolourise bromine water
(C) They are saturated hydrocarbons
(D) They undergo addition reactions

Correct Answer: C

Explanation: Alkenes are unsaturated hydrocarbons, not saturated.

29. A new metal was discovered and found to react with steam but not cold water. Where would you place it in the reactivity series?

(A) Highly reactive
(B) Less reactive
(C) Unreactive
(D) Moderately reactive

Correct Answer: D

Explanation: The new metal would be placed in the moderately reactive group because it reacts with steam but not cold water.

30. Which of the following statements about the Haber process is correct?

(A) It is an exothermic reaction
(B) It is an endothermic reaction
(C) It is a neutral reaction
(D) It does not involve a catalyst

Correct Answer: A

Explanation: The Haber process is an exothermic reaction.

31. In the Haber process, what is the effect of increasing pressure on the yield of ammonia?

(A) Decreases the yield
(B) Increases the yield
(C) No effect
(D) Stops the reaction

Correct Answer: B

Explanation: Increases the yield — this correctly answers the question.

32. In the Haber process, what is the effect of increasing temperature on the yield of ammonia?

(A) Increases the yield
(B) No effect
(C) Decreases the yield
(D) Stops the reaction

Correct Answer: C

Explanation: Decreases the yield — this correctly answers the question.

33. In the Contact process, what is the effect of increasing pressure on the yield of SO□?

(A) Decreases the yield
(B) No effect
(C) Stops the reaction
(D) Increases the yield

Correct Answer: D

Explanation: Increases the yield — this correctly answers the question.

34. In the Contact process, what is the effect of increasing temperature on the yield of SO□?

(A) Decreases the yield
(B) Increases the yield
(C) No effect
(D) Stops the reaction

Correct Answer: A

Explanation: Decreases the yield — this correctly answers the question.

35. Which of the following is a source of nitrogen oxides in the atmosphere?

(A) Vehicle engines
(B) All of the above
(C) Industrial activities
(D) Combustion processes

Correct Answer: B

Explanation: Nitrogen oxides are produced from vehicle engines, industrial activities, and combustion processes.

36. Compare the roles of NO and NO□ in the formation of acid rain. How do their chemical behaviours contribute to both direct acid formation and the oxidation of sulphur dioxide?

(A) NO directly forms nitric acid; NO□ catalyses the oxidation of SO□
(B) NO directly forms nitric acid; NO catalyses the oxidation of SO□
(C) NO□ directly forms nitric acid; NO□ catalyses the oxidation of SO□
(D) NO□ directly forms sulphuric acid; NO□ catalyses the oxidation of SO□

Correct Answer: C

Explanation: NO□ reacts with water and oxygen to form nitric acid directly. NO□ also catalyses the oxidation of SO□ to SO□, which then forms sulphuric acid.

37. Analyse the classification of oxides. Why are oxides like SO□ considered acidic, while oxides like CuO are considered basic?

(A) SO□ is a metal oxide; CuO is a non-metal oxide
(B) SO□ is amphoteric; CuO is acidic
(C) SO□ is basic; CuO is acidic
(D) SO□ is a non-metal oxide; CuO is a metal oxide

Correct Answer: D

Explanation: SO□ is a non-metal oxide; CuO is a metal oxide — this correctly answers the question.

38. In the Contact process, sulphur dioxide is converted to sulphur trioxide: 2SO□□g□ + O□□g□ rightleftharpoons 2SO□□g□ + 45.2\ kcal How many moles of SO□ are needed to produce 6 moles of SO□?

(A) 6 moles
(B) 3 moles
(C) 12 moles
(D) 18 moles

Correct Answer: A

Explanation: 6 moles — this correctly answers the question.

39. In the Contact process, how many moles of O□ are needed to react with 6 moles of SO□?

(A) 1 mole
(B) 3 moles
(C) 2 moles
(D) 6 moles

Correct Answer: B

Explanation: 3 moles — this correctly answers the question.

40. If the actual yield of SO□ is 4 moles, what is the percentage yield?

(A) 75.00%
(B) 80.00%
(C) 66.67%
(D) 50.00%

Correct Answer: C

Explanation: 66.67% — this correctly answers the question.

41. In the Haber process, nitrogen and hydrogen react to form ammonia: N□□g□ + 3H□□g□ rightleftharpoons 2NH□□g□ How many moles of H□ are needed to react with 4 moles of N□?

(A) 4 moles
(B) 8 moles
(C) 16 moles
(D) 12 moles

Correct Answer: D

Explanation: 12 moles — this correctly answers the question.

42. How many moles of NH□ are produced from 4 moles of N□?

(A) 8 moles
(B) 4 moles
(C) 6 moles
(D) 10 moles

Correct Answer: A

Explanation: 8 moles — this correctly answers the question.

43. If the actual yield of NH□ is 6 moles, what is the percentage yield?

(A) 60%
(B) 75%
(C) 80%
(D) 90%

Correct Answer: B

Explanation: 75% — this correctly answers the question.

44. Which of the following statements about the reactivity series is correct?

(A) Potassium is less reactive than copper
(B) Zinc is more reactive than magnesium
(C) Sodium is more reactive than calcium
(D) Gold is more reactive than silver

Correct Answer: C

Explanation: Sodium is more reactive than calcium — this correctly answers the question.

45. Which of the following metals reacts with steam but not cold water?

(A) Potassium
(B) Sodium
(C) Gold
(D) Magnesium

Correct Answer: D

Explanation: Magnesium reacts with steam but not significantly with cold water.

46. Which of the following metals does not react with cold water, steam, or dilute acids?

(A) Gold
(B) Zinc
(C) Iron
(D) Copper

Correct Answer: A

Explanation: Gold is an unreactive metal and does not react with cold water, steam, or dilute acids.

47. Which of the following statements about the Contact process is correct?

(A) The reaction is endothermic
(B) The reaction is exothermic
(C) The reaction is neutral
(D) The reaction does not involve a catalyst

Correct Answer: B

Explanation: The Contact process is an exothermic reaction.

48. What is the effect of increasing pressure on the yield of SO□ in the Contact process?

(A) Decreases the yield
(B) No effect
(C) Increases the yield
(D) Stops the reaction

Correct Answer: C

Explanation: Increases the yield — this correctly answers the question.

49. What is the effect of increasing temperature on the yield of SO□ in the Contact process?

(A) Increases the yield
(B) No effect
(C) Stops the reaction
(D) Decreases the yield

Correct Answer: D

Explanation: Decreases the yield — this correctly answers the question.

50. Which of the following is an example of an amphoteric oxide?

(A) ZnO
(B) SO□
(C) CO□
(D) Na□O

Correct Answer: A

Explanation: ZnO is an amphoteric oxide; it reacts with both acids and bases.