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S4 CHEMISTRY

Exam 11

PAPER 1

DURATION: 1 hour 30 minutes

Instructions

- This paper consists of 50 compulsory objective questions
- Answer the questions by writing the correct alternative in the box on the right side of the question.

- The number of electrons in one atom of the element represented by 7_3X is
 A: 3 B: 4 C: 7 D: 10
- Which one of the following oxides will dissolve in dilute sodium hydroxide but not in dilute nitric acid?
 A: Al_2O_3 B: ZnO C: PbO D: SiO_2
- Permanent hardness may be removed from water by the addition of large quantities of
 A: $Ca(HCO_3)_2$ B: $Ca(OH)_2$ C: K_2CO_3 D: $CaCO_3$
- Which one of the following gases is formed when is formed when excess ammonia gas is reacted with chlorine?
 A: Nitrogen monoxide B: Dinitrogen oxide
 C: Hydrogen chloride D: Nitrogen

5. Iron was allowed to rust in 1 litre of moist air and the volume of air remaining were measured at atmospheric pressure each day. The results were as follows:

Days	0	1	2	3	4	5	6	7	8	9
Volume cm ³	1000	950	900	860	830	810	800	800	800	800

If unruled iron remained at the end of the experiment, which one of the following is incorrect statement from this experiment?

A: $\frac{1}{5}$ of air is oxygen

B: $\frac{4}{5}$ of air does not react with iron

C: The reaction had stopped after six days.

D: Rusting occurs at a constant rate.

6. Why is a salt containing the radical HSO_4^- known as an acid salt?

A: the radical liberates hydrogen ions in aqueous solution.

B: the radical contains hydrogen

C: the radical has a negative charge

D: a salt containing the radical is derived from sulphuric acid

7. A metal Y has no reaction with warm water, but precipitates copper from copper (II) sulphate solution with the formation of a colorless solution. Y may be

A: potassium

B: zinc

C: lead

D: magnesium

8. If carbon dioxide is bubbled into calcium hydroxide solution for a very long time and dilute hydrochloric acid is then added, the solution would:

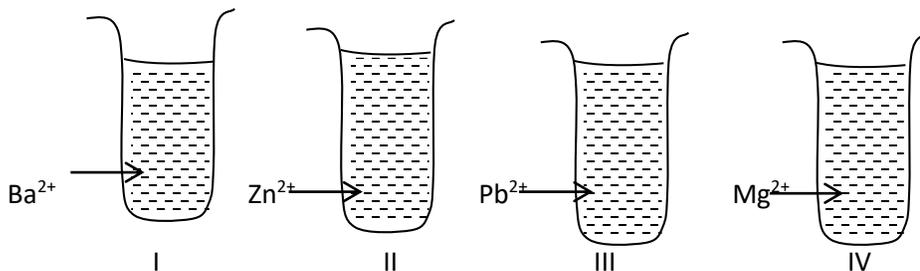
A: go clear

B: go cloudy

C: remain the same

D: effervescence

9. 1cm³ of dilute sulphuric acid was added to four test tubes containing solutions of different cations as shown below



The white precipitate was obtained in test tube numbers

A: I, II, IV

B: I, III, IV

C: I, III

D: III, IV

10. 20.0cm³ of dilute sulphuric acid needed 25.0cm³ of 0.1M sodium hydrogen carbonate solution for complete neutralization. The molarity of the sulphuric acid is

A: $\frac{25 \times 0.1}{20}$

B: $\frac{25 \times 0.1 \times 2}{20}$

C: $\frac{25 \times 0.1}{20 \times 2}$

D: $\frac{20 \times 2}{25 \times 0.1}$

11. Which one of the following oxides decreases in mass when heated in a current of dry carbon monoxide?

A: calcium oxide

B: zinc oxide

C: magnesium oxide

D: Aluminium oxide

12. When potassium manganate (VII) is heated it decomposes according to the equation:



If 1.58g of potassium manganate (VII) are heated, the maximum volume, in cm³ of oxygen (under conditions of temperature and pressure where one mole of molecules of a gas occupies 24 litres) that can be evolved is. (Mn = 55, K = 39, O=16)

A: 60

B: 120

C: 240

D: 480

13. Element T reacts with hydrogen to form a hydride with the formula TH₃ and forms acid oxides. To which one of the following groups in the periodic table does T belong?

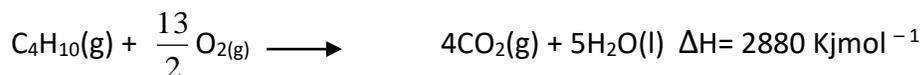
A: I

B: III

C: V

D: VII

14. Butane burns in air according to the following equation



The quantity of heat evolved when 16dm³ of butane is burnt at s.t.p is. (1 mole of a gas occupies 22.4dm³ at s.t.p)

A: $\frac{2880 \times 16}{2 \times 22.4}$

B: $\frac{2880 \times 16}{22.4}$

C: $\frac{2880 \times 116}{2 \times 22.4}$

D: $\frac{220 \times 116}{22.4}$

15. The atomic numbers of elements Q,R,T and W are 2,15,19, and 20 respectively. Which one of the elements shows similar properties as an element with atomic number 10?

A: Q

B: R

C: T

D: W

16. All of the following apply to carbon dioxide except. It

A: is acidic in character

B: is reduced when heated with carbon

C: supports the combustion of sulphur

D: is covalent in character

17. Which one of the following remains as a solid residue when hydrated iron (II) sulphate is strongly heated?

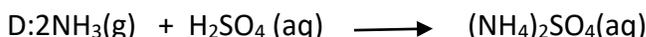
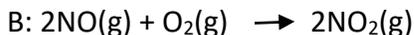
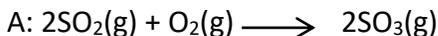
A: Iron (II) oxide

B: Iron (III) oxide

C: Triiron tetroxide

D: Iron (III) sulphate.

18. Which one of the following reactions is catalyzed by platinum gauze on an industrial scale?



19. Iron reacts with dilute sulphuric acid according to the following equation



The number of moles of hydrogen ions required to react completely with 2.8g of iron is

A: $\frac{2.8}{56 \times 2}$

B: $\frac{2.8 \times 2}{56}$

C: $2.8 \times 2 \times 56$

D: $\frac{2.8 \times 56}{2}$

20. Which one of the following nitrates will leave no solid residue after strong heating?

A: silver nitrate

B: Ammonium nitrate

C: potassium nitrate

D: calcium nitrate.

21. Ammonium sulphate reacts with potassium hydroxide according to the equation



Calculate the volume of ammonia at room temperature, produced when 2.64g of ammonium sulphate is reacted with potassium hydroxide. (N = 14, S = 32, O = 16, H = 1, 1 mole of a gas occupies 24dm^3 at room temperature)

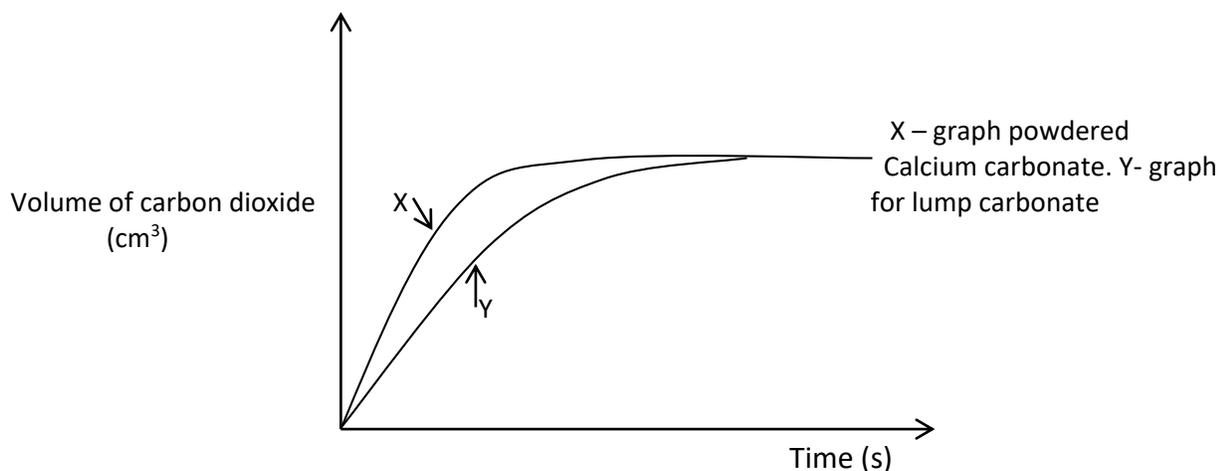
A: 0.48dm^3

B: 0.96dm^3

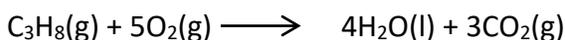
C: 1.92dm^3

D: 4.80dm^3

22. The graph below shows the variation of volume of carbon dioxide evolved with time when excess 5M hydrochloric acid was added to calcium carbonate, the mass used being the same in each case. Why are the graphs different?



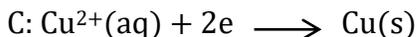
- A: different concentrations of calcium carbonate were used.
 B: volume of gas evolved is independent of mass of solids
 C: the rate at which the reaction proceeds depends on particle size
 D: powdered calcium carbonate catalyses the reaction.
23. Which one of the following is a reason why covalent compounds usually have low melting points?
 A: because covalent bonds are weaker than ionic bonds
 B: because covalent compounds exist as separate molecules
 C: because covalent bonds are easily broken by heat but ionic bonds are not.
 D: because covalent compounds are soluble in organic solvents.
24. Which one of the following gases is used in industrial preparation of nitrogen fertilizers?
 A: Ammonia
 B: Nitrogen dioxide
 C: Dinitrogen oxide
 D: Nitric oxide.
25. Propane burns in oxygen according to the following equation.



The volume of oxygen required for complete combustion of propane to produce 45dm³ of carbon dioxide is

- A: 225dm³ B: 27dm³ C: 15dm³ D: 75dm³

26. Which one of the following represents the reaction at the anode during electrolysis of copper (II) sulphate using copper electrodes?



27. Which one of the following is not a property of graphite?

Graphite

A: is a good conductor of electricity

B: burns in oxygen to produce carbon dioxide

C: is soft

D: is colourless and transparent

28. Which one of the following ions will react with a hot solution of sodium chloride to form a colourless solution which forms needle like crystals on cooling

A: Pb^{2+}

B: Cu^{2+}

C: Fe^{2+}

D: Fe^{3+}

29. 25.4g of metal W, reacts completely with 22.6g of oxygen to form an oxide. Which one of the following is the formula of the oxide of W?

(O = 16, W = 27)

A: WO_2

B: W_2O

C: W_2O_3

D: W_3O_2

30. Which one of the following is not an ore of iron?

A: Magnetite

B: Steel

C: Haematite

D: Siderite

31. Which one of the following alloys contains copper?

A: solder

B: magnalium

C: steel

D: Duralumin

32. Which one of the following is characteristic of the element of electronic configuration 2:4?

A: forms ions by electron loss

B: will form an acidic and a neutral oxide

C: does not conduct electricity

D: is a gas at room temperature

33. An aqueous solution of potassium iodide turns brown when a solution X is added to it. Which one of the following is likely to be solution X?

A: chlorine water

B: lead (II) nitrate

C: iron (III) sulphate

D: copper (II) sulphate

34. The percentage by mass of nitrogen in a mole of magnesium nitride is

(Mg = 24, N = 14)

A: 72

B: 48

C: 28

D: 42

35. Copper can be separated from a mixture of zinc powder and copper powder by adding to the mixture
 A: concentrated sulphuric acid B: dilute sulphuric acid
 C: zinc sulphate solution D: concentrated nitric acid
36. 50cm³ of 0.5M aqueous copper (II) sulphate solution was mixed with excess zinc powder in plastic bottle. The temperature of the solution increased by 25°C as a result of the reaction. The approximate heat of reaction per mole of copper (II) ions is
 A: + 105KJ B: – 105 KJ C: + 210KJ D: – 210 KJ
37. Which one of the following acids is completely dissociated in aqueous solution?
 A: Carbonic acid B: Ethanoic acid
 C: Nitric acid D: citric acid
38. A liquid L reacts with sodium chloride to give a colourless gas which fumes with ammonia liquid L is likely to be
 A: concentrated hydrochloric acid B: concentrated sulphuric acid
 C: absolute ethanol D: dilute nitric acid
39. The process by which the properties of rubber are improved by heating it with sulphur is called
 A: polymerization B: catalysis C: dehydration D: vulcanization
40. Which one of the following salts can be prepared by action of dilute acid on a metal?
 A: PbCl₂ B: CuSO₄ C: ZnSO₄ D: AgCl

Each of the questions 41 to 45 consists of an assertion (statement) on the left hand side and a reason on the right hand side. Select

A: if both the assertion and the reason are true statements and the reason is a correct explanation of the assertion

B: if both the assertion and the reason are true statements but the reason is not a correct explanation of the assertion

C: if the assertion is true but the reason is not a correct statement.

D: if the assertion is not correct but the reason is a correct statement.

INSTRUCTIONS SUMMARISED

Assertion	Reason
A: True	True (reason is correct explanation)
B: True	True (Reason not a correct explanation)
C: True	Incorrect
D: Incorrect	Correct

41. Nitrogen is essential for plants and animals because free nitrogen forms approximately 80% of the atmosphere
42. Iron is used as the cathode in the electrolysis of fused sodium chloride in industry because sodium is more electropositive than iron
43. Amphoteric oxides have same chemical properties as basic oxides because amphoteric oxides will neutralize mineral acids
44. Ethanol is obtained by the fermentation of glucose because Enzymes convert glucose to ethanol and carbondioxide
45. The heat of combustion of methane is less than that butane, C_4H_{10} because a molecule of butane is smaller than a molecule of methane.

In each of the questions 46 to 50, one or more of the answers given may be correct. Read each question carefully and then indicate the correct answer according to the following

- A: If 1,2 and 3 only are correct
 B: If 1 and 3 only are correct
 C: if 2 and 4 only are correct
 D: If 4 only is correct

46. Which of the following reactions occurs when sodium metal is exposed to moist air?

- $4Na(s) + O_2(g) \longrightarrow 2Na_2O(s)$
- $Na_2O(s) + H_2O(l) \longrightarrow 2NaOH(aq)$
- $2NaOH(aq) + CO_2(g) \longrightarrow Na_2CO_3 \cdot H_2O(s)$
- $2Na(s) + 2H_2O(l) \longrightarrow 2NaOH(aq) + H_2(g)$

47. For which of the following is chlorine used?

- Sterilization of water supplies
- Manufacture of bleaching agents
- Manufacture of hydrogen chloride
- Manufacture of detergents

48. Which of the following will increase the yield of ammonia from the reaction between nitrogen and hydrogen?

1. Increased pressure
2. Increased temperature
3. Use of a catalyst
4. By reacting dry gases only.

49. Which of the following will reduce copper (II) oxide to the metal?

1. Methane
2. Ammonia
3. Sulphur dioxide
4. Hydrogen

50. Why is oxygen evolved from chlorine water which has been standing for some time?

1. Hydrochloric acid liberates oxygen in sunlight
2. Chlorine displaces oxygen from water
3. Chlorine ionizes in water
4. Hypochlorous acid liberates oxygen in sunlight.

END