XI -Chemistry Important Questions

1. Define : Relative atomic mass.

$$\text{Relative atomic mass} = \frac{\text{Average mass of the atom}}{\text{Unified atomic mass}}$$

2. Distinguish Between oxidation and reduction.

Oxidation	Reduction
i) Addition of oxygen	Removal of oxygen
ii) Removal of hydrogen	Addition of hydrogen
iii) Loss of electrons	Gain of electrons

3. Define: Equivalent Mass.

Gram equivalent mass of an element, compound or ion is the mass that combines or displaces 1.008 g hydrogen or 8 g oxygen or 35.5 g chlorine.

4. What do you understand by the term mole?

One mole is the amount of substance of a system, which contains as any elementary particles as there are atoms in 12g of carbon – 12

5. What is Limiting agent?

The reactant that is completely consumed. The reactant limits the further reaction from taking place.

6. What is Excess agent?

The reactant other than the limiting reagent which are in excess are called the excess reagents.

7. What are combination reaction?

Redox reaction in which two substances combine to form a single compound.

8. What are decomposition reactions?

Redox reactions in which a compound breaks down into two or more components.

9. What are Disproportionation reaction (Auto redox reactions).

In some redox reactions, the same compound can undergo both oxidation and reduction.

10. What do you stand by the term oxidation number?

It is defined as the imaginary charge left on the atom when all other atom of the compound have been removed in their usual oxidation states that are assigned according to set of rules.

11. Define: Avogadro number.

The total number of entities present in one mole of any substance is equal to 6.022×10^{23}.

12. Which quantum number reveal. Information about the shape, energy, orientation and size of orbitals?

Shape	Energy	Orientation	Size
l	N	M	N

13. How many orbitals are possible for n = 4?

n = 4, l = 0, 1, 2, 3

For sub-shell having 4s, sp, sd, sf

′4s′ orbital = 1

′4p′ orbital = 3

′4d′ orbital = 5

′4f′ orbital = 7

Total 16 orbital

14. State: Aufbau principle.

In the ground state of the atoms, the orbitals are filled in the order of their increasing energies.

15. State: Heisenberg uncertainty principle.

'It is impossible to accurately determine both the position as well as the momentum of a microscopic particle simultaneously. $\Delta x. \Delta p \geq \frac{h}{4\pi}$

16. What is Zeeman effect?

The splitting of spectral lines in a magnetic field.

17. State : Hund's rule of maximum multiplicity.

Electron pairing in the degenerate orbitals does not take place until all the available orbitals contains one electron each.

18. Define: Modern periodic law.

"The physical and chemical properties of the elements are periodic functions of their atomic numbers"

19. What are is electronic ions? Give example.

Ions having the same number of electrons but different nuclear charge.

Eg- N^{3-}, O^{2-}

20. What is effective nuclear charge (Z*)

The net nuclear charge experienced by valence electrons in the outermost shell.

$$Z_{eff} = Z - S$$

21. Define : Electronegativity.

"The relative tendency of a bonded atom in a molecule to attract the shared electron pair towards itself".

22. Define ionisation enthalpy.

The minimum amount of energy required to remove the most loosely bound electron from the valence shell of the isolated neutral gaseous atom in its ground state. It is expressed in kJ mol^{-1} or in eV.

23. Why halogens act as oxidizing agents?

1. Halogens are highly electro negative and with high negative electron gain enthalpies.
2. Therefore, they have high tendency to gain an electron. Hence they act as strong oxidizing agents.

24. Explain the Diagonal relationships.

1. The similarity in properties existing b/w the diagonally placed elements is called diagonal relationship

Ex: Li → Be

Na → Mg

25. What is periodicity?

The repetition of physical and chemical properties at regular intervals is called as periodicity.

26. State: Mendeleev's periodic law.

The properties of the elements can be represented as periodic functions of their atomic weights.

27. State: Newland's Law of octaves.

When elements are arranged in the order of increasing atomic weights

The properties of every eighth element are similar to of the properties of the first element.

28. What is Mosley's equation? Explain the terms in it.

$\sqrt{\nu} = a(z - b)$, v= frequency of the x-rays emitted by the elements.

a & b = constants and have same values for all the elements.

29. Do you think that heavy water can be used for drinking purposes?

Yes, it is non toxic and non radioactive. It is chemically the same as H_2O. It won't make you sick and it won't make you glow.

30. What is water gas shift reaction?

$$CO + H_2O \xrightarrow[400°C]{Fe/Cu} CO_2 + H_2$$

31. What are isotopes? Write the names of isotopes of hydrogen

Atoms of the same element having same atomic number but different mass number are called isotopes. Eg: ${}_1H^1$, ${}_1H^2$, ${}_1H^3$

32. Give the uses of heavy water.

1. It is used as moderator in nuclear reactors.
2. It is used as a tracer to study organic reaction mechanisms and mechanism of metabolic reactions.
3. It is also used as a coolant in nuclear reactors.

33. How do you convert para hydrogen into ortho hydrogen?

1. By treatment with catalysts like Pt or Fe.
2. By passing an electric discharge.
3. By heating to 800°C or more.
4. By mixing with paramagnetic molecules like O_2, NO, NO_2

34. An the cube at $0°C$ is placed in some liquid water at $0°C$, the ice cube sinks- why?

At $0°C$, ice cubes sinks in liquid water at $0°C$ because of the lesser density and greater volume of water.

35. Write the three type of covalent hydrides.

1. Electron precise hydrides. eg. CH_4
2. Electron deficient hydrides. eg. B_2H_6
3. Electron rich hydrides. eg. NH_3

36. Explain the exchange reactions of Deuterium.

Deuterium can replace reversibly hydrogen in compounds either partially or completely depending upon the reaction conditions. $CH_4 + 2D_2 \rightarrow CD_4 + 2H_2$

37. Mention the uses of Deuterium.

- It is used as tracers in the study of mechanism of chemical reactions.
- High speed deuterons are used in Artificial radioactivity.
- It's oxide (D_2O) is used as moderator in nuclear reactor to slow down the speed of fast moving neutrons.

38. How do you explain the metallic hydrides to be useful for hydrogen storage?

- In metallic hydrides, hydrogen is absorbed as H-atoms.
- This property of adsorption of hydrogen on transition metals such as Pd, Pt can accommodate a very large volume of hydrogen.
- This property has high potential for hydrogen storage and as a source of energy.
- Metallic hydrides on heating decompose.

39. Compare the structure of H_2O and H_2O_{2+}

Structure of H_2 O

- In water, oxygen is 'sp' hybridized.
- Due to stronger lone pair repulsions than bond pair repulsions, the HOH bond angle decreases from 109.5° to 104.5°

Structure of H_2 O

- It is highly polar molecule.
- It has non-planar structure.
- Dipolemoment value of H_2 O_2 suggest that all the four atoms in H_2O_2 do not lie in a plane.

40. What is meant by Hard water?

- It contains high amounts of mineral ions.
- Presence of soluble metal cations such as Mg, Ca, A/ and Mn salts in the form of bicarbonate, chloride and sulphate in water makes hard water.

41. How temporary hardness can be removed by Clark's method?

In this method calculated amount of lime is added to hard water containing the magnesium and calcium, and the resulting carbonates and hydroxides can be filtered off.

42. What is permanent hardness of water? Explain how it is removed?

$MCl_2 + Na_2CO_3 \rightarrow MCO_3 + 2NaCl$, $MSO_4 + Na_2CO_3 \rightarrow MCO_3 + Na_2SO_4$

43. How exhausted zeolites can replenished?

The exhausted, zeolite materials can be regenerated by treating with aqueous sodium chloride. Hard minerals caught in the zeolite are released and they get replenished with sodium ions. $M - Z + 2\ NaCl \rightarrow Na - Z + MCl_2$

44. What is Hydrogen bond?

The polarized hydrogen atom is able to form a weak electrostatic interaction with another electronegative atom present in the vicinity. This interaction is called as a hydrogen bond.

45. Why H_2O_2 is stored in plastic bottles? Give reason.

H_2O_2 is not stored in glass container, because it dissolves the alkali metals from the glass, which catalyzes the disproprtionation reaction. For this reason H_2O_2 is stored un plastic bottles. $H_2O_2 \rightarrow H_2O + ½\ O_2$

46. What is Intramolecular hydrogen bond?

Intramolecular hydrogen bonds are those which occur within one single molecule this occurs between two functional groups within a molecule.

Eg. O-nitrophenol, salicyaldehyde.

47. What is intermolecular hydrogen bond? Give example.

Intermolecular hydrogen bonds occur between two separate molecules. Each water molecule is linked to four others through hydrogen bonds. The shorter distance correspond to covalent bonds.

48. What are Zeolites?

- Zeolites are hydrated sodium aluminiosilicates with a general formula.
- Hardness of water can be removed by passing through zeolites.

49. How is permanent hardness of water removed by Zeolite method.

Zeolites are hydrated sodium alumino silicates. Zeolites have porous structure in which the monovalent sodium ions are loosely held and can be exchange with hardness producing divalent metal ions

50. Why H_2O_2 is kept in a dark colored bottles?

Because H_2O_2 decomposes slowly when exposed to light.

51. H_2O is liquid but H_2S is a gas at room temperature. Why?

The liquid state of water is because of presence of intermolecular H-bonding.

H_2S is a gas due to the absence of inter molecular H-bonding.

52. Differentiate Hard water from Soft water.

Hard Water	Soft water
Presence of Ca Mg in the form of bicarbonate chloride and sulphate.	Presence of soluble salts of Ca and Mg.
Cleaning nature of soap is reduced when used in hard water.	Cleaning capacity of soap is more when used in soft water.
When hard water is boiled deposits of insoluble carbonates of Mg and Ca are obtained.	When soft water is boiled, there is no deposition of salts.

53. Ice floats on water. Why?

Density of ice is less than that of liquid water, so, it floats over water.

54. Write any three similarities between Beryllium and Aluminium?

Be and Al ions have strong tendency to form complexes. **Eg.** BeF_4^{2-}, AlF_6^{3-}

55. Give the systematic names for the following

i) milk of magnesia ii) lye iii) lime

iv) caustic potash v) washing soda vi) soda ash

vii) trona

1. Milk of magnesia - Magnesium hydroxide
2. Lye - Sodium hydroxide
3. Lime - Calcium hydroxide
4. Caustic potash - Potassium hydroxide
5. Washing soda
6. Soda ash - Sodium carbonate
7. Trona

56. Write the uses of Plaster of paris.

- It is used in building industry and plasters.
- It is used for immobilising agent in bone.
- It is used in dentistry, in ornamental work and for making casts of statues.

57. How is plaster of paris prepared ?

Hemihydrate of calcium sulphate is called plaster paris. It is obtained when gypsum, $CaSO_4\ 2H_2O$, is heated to 393 K.

$2CaSO_4 . 2H_2O \rightarrow 2CaSO_4 . H_2O + 2H_2O$

58. Give the uses of Gypsum.

- Gypsum is used in making drywalls or plaster boards.
- Another important use of gypsum is the production of plaster of Paris.
- Gypsum is used in making surgical and orthopedic casts.

59. What is sodalime?

The mixture of quick lime (CaO) and sodium hydroxide.

60. What is slaked lime?

Calcium hydroxide – $Ca(OH)_2$

61. What is Milk of lime?

A suspension of slaked lime in water is known as Milk of lime.

62. Write the uses of Quick lime (or) Calcium oxide.

- To manufacture cement, mortar and glass.
- In the manufacture of sodium carbonate.
- In the purification of sugar.
- As drying agent.

63. State – Le – Chatelier principle.

"If a system at equilibrium is disturbed, then the system shifts itself in a direction that nullifies the effect of that disturbance".

64. State law of Mass action.

"At any instant, the rate of a chemical reaction at a given temperature is directly proportional to the product of the active masses of the reactants at that instant".

65. Explain how will you predict the direction of a equilibrium reactions.

By knowing the Q value, we can predict the direction of the reaction by comparing it with K_c.

- If $Q = K_c$, - equilibrium state.
- If $Q > K_c$, - reverse direction i.e. formation of reactants.
- If $Q < K_c$, - forward direction i.e. formation of products

66. What is Homogeneous equilibrium ? Give an example.

In a homogenous equilibrium, all the reactants and products are in the same phase.

67. What is Heterogeneous equilibrium? Give at example.

If the reactants and products are present in different phases.

68. Define : Reaction quotient(Q).

At non-equilibrium condition the ratio of the products of active masses of reaction products raised to the respective stoichiometric coefficients in the balanced chemical equation to that of the reactants.

69. How is Acid rain formed? Explain its effect.

Acid rain consists of SO_2 and NO_2. They are converted into sulphuric acid and nitric acid respectively by the reaction with oxygen and water.

$2SO_2 + O_2 + 2H_2O \rightarrow 2H_2SO_4$ $4NO_2 + O_2 + 2H_2O \rightarrow 4HNO_3$

70. What is Green chemistry?

Efforts to control environmental pollution resulted in development of science for synthesis of chemicals favorable to environment.

Green chemistry means science of environmentally favorable chemical synthesis.

71. How is bleaching powder prepared?

Milk of lime reacts with chlorine to form hypochlorite it is called bleaching powder.

72. What is salking of lime?

The process of the addition of limited amount of water breaks the lump of lime. Is called slaking of lime and the product is slaked lime. $CaO + H_2O \; Ca(OH)_2$

73. Explain the term "Retrograde solubility".

Unlike other salts, gypsum becomes less soluble in water as the temperature increases. This is known as retrograde solubility, which is a distinguishing characteristic of gypsum.

74. What is Gypsum plaster? Give its use.

- Gypsum is heated to about 300°F to produce plaster of paris, which is also known as Gypsum plaster.
- It is used as a sculpting material.

75. What is Desert rose?

Gypsum crystals are sometimes occur in a form that resembles the referred the petals of a flower. This type of formation is referred to as Desert rose.

********** EFFORT NEVER DIES **********

N.RAMACHANDRAN, M.Sc., B.Ed.,
G.VELMURUGAN, M.Sc., B.Ed.,
ULUNDURPET.