**QUESTION BANK**

**MULTIPLE CHOICE QUESTIONS**

1. A pure substance which contains only one type of atom is called ————–.
   1. An element
   2. a compound
   3. a solid
   4. a liquid
2. Formation of H2O and H2O2 illustrates the law of ————–.
   1. Law of conservation of mass
   2. Law of Reciprocal proportion
   3. Law of Constant Proportion
   4. Law of Multiple Proportion
3. Which of the following is a homogeneous mixture?
   1. Mixture of soil and water
   2. Sugar solution
   3. Mixture of sugar, salt and sand
   4. Iodised table salt
4. Neutron was discovered by ————–
   1. J.J Thomson
   2. Chadwick
   3. Rutherford
   4. Priestley
5. The number of significant figures in 6.626 x 10-34 is ————–.
   1. 34
   2. 3
   3. 4
   4. 26
6. Molecular mass of C12H22O11
   * 1. 342 g/ mol
     2. 35 g/ mol
     3. 354 g/ mol
     4. 324 g/ mol
7. The radius of an atomic nucleus is of the order of————–
   1. 10-10 cm
   2. 10-13 cm

(c)10-15 cm

(d) 10-8 cm

1. Which of the following electronic configurations of an atom has the lowest ionisation enthalpy?
   1. 1s2 2s2 2p3
   2. 1s2 2s2 2p6 3s1
   3. 1s2 2s22p6
   4. 1s2 2s2 2p5
2. The Ionic radius of cation is always———
   1. Less than the atomic radius
   2. more than the atomic radius
   3. Equal to atomic radius
   4. Cannot be predicted
3. Which of the following is not true for cathode ray tube
   1. They are EMR rays
   2. Produce heat
   3. Produce mechanical pressure
   4. Possess kinetic energy
4. Which one of them is the weakest?
   1. Ionic bond
   2. Covalent bond
   3. Metallic Bond
   4. van der Waals force
5. In discharge tube experiment negative charged particles travels from
   * 1. cathode to anode
     2. anode to cathode
     3. electron does not travel
     4. none of the above
6. How many electrons are present in NO32-
   1. 33
   2. 32
   3. 31
   4. 30
7. The bond angle around atom which uses sp2 hybridization is ———–
   1. 1200
   2. 1800
   3. 1070
   4. 1090. 28’
8. Formation of CO and CO2 illustrates the law of ————–.
   1. Law of conservation of mass
   2. Law of Reciprocal proportion
   3. Law of Constant Proportion
   4. Law of Multiple Proportion
9. A sub-shell with n = 6 , l = 2 can accommodate a maximum of
   1. 12 electrons
   2. 36 electrons
   3. 10 electrons
   4. 72
10. Principal, Azimuthal and magnetic quantum numbers are respectively related to:
    1. Size, shape and orientation
    2. Shape, size and orientation
    3. Size, orientation and shape
    4. None of the above
11. In the modern periodic table, the period indicates the value of:
    1. Atomic Number
    2. Atomic Mass
    3. Principal Quantum Number
    4. Azimuthal Quantum Number
12. According to the periodic law of elements, the variation in properties of elements is related to their
    * + 1. neutron – proton number ratios
        2. atomic masses
        3. nuclear masses
        4. atomic numbers
13. The ion which is iso-electronic with CO is —————
    1. CN–
    2. O2–
    3. N2+
    4. O2+
14. The most electronegative element in the periodic table is———
    1. Nitrogen
    2. Oxygen
    3. Chlorine
    4. Fluorine
15. The most electronegative element of the periodic table is
    * + 1. Iodine
        2. Sulphur
        3. Oxygen
        4. Fluorine
16. The electronic configuration of halogen is
    * + 1. ns2np6
        2. ns2np3
        3. ns2np5
        4. ns2
17. In the third period of the Periodic Table the element having smallest size is
    * + 1. Na
        2. Ar
        3. Cl
        4. Si
18. Which among the following has the largest dipole moment?  
    (a) NH3  
    (b) H2O  
    (c) HI  
    (d) SO3
19. The correct bond order in the following species is —————.
    1. O2+ < O2– < O22+
    2. O2– < O2+ < O22+
    3. O22+ < O2+ < O2–
    4. O22+ < O2–< O2+
20. According to Aufbau principle a new electron enters the orbitals when:
    1. (n + l) is minimum
    2. (n + l) is maximum
    3. (n + m) is minimum
    4. (n + m) is maximum
21. A measured temperature on Fahrenheit scale is 200F. What will this reading be on the Celsius Scale?
    1. 40 ℃
    2. 94 ℃
    3. 93.3 ℃
    4. 30 ℃
22. **Assertion:**The bond order of helium is always zero.  
    **Reason:**The number of electrons in bonding molecular orbital and antibonding molecular orbital is equal.
23. Assertion (A): Significant figures for 0.200 is 3 where as for 200 it is 1.

Reason (R): Zero at the end or right of a number are significant provided they

1. Assertion (A): All isotopes of a given element show the same type of chemical behaviour.  
   Reason (R): The chemical properties of an atom are controlled by the number of electrons in the atom.
2. **Assertion :**Second period consists of 8 elements.  
   **Reason :**Number of elements in each period is four times the number of atomic orbitals available in the energy level that is being filled.
3. **Assertion :**Alkali metals have least value of ionization energy within a period.  
   **Reason :**They precede alkaline earth metals in periodic table.
4. **Assertion :**Helium is placed in group 18 along with p-block elements.  
   **Reason :**It shows properties similar to p-block elements.
5. **Assertion :** The position of an electron can be determined exactly with the help of an electron microscope.  
   **Reason :**The product of uncertainty in the measurement of its momentum and the uncertainty in the measurement of the position cannot be less than a finite limit.
6. **Assertion:**One atomic mass unit is defined as one twelfth of the mass of one carbon – 12 atom.  
   **Reason:**Carbon-12 isotope is the most abundant isotope of carbon and has been chosen as standard.
7. Assertion (A): Boron has a smaller first ionisation enthalpy than beryllium.  
   Reason (R): The penetration of a 2s electron to the nucleus is more than the

2p electron hence 2p electron is more shielded by the inner core of electrons than the 2s electrons.  
38. Assertion (A): Sodium chloride formed by the action of chlorine gas on sodium metal is a stable compound.  
Reason: This is because sodium and chloride ions acquire octet in sodium chloride formation.

**SHORT ANSWER TYPE QUESTIONS:**

1. Arrange s, p and d sub-shells of a shell in the increasing order of effective nuclear charge (Zeff) experienced by the electron present in them.
2. Explain the non linear shape of H2S and non planar shape of PCl3 using valence shell electron pair repulsion theory.
3. Classify following as pure substances and mixtures – Air, glucose, gold, Sodium and milk.
4. How is matter classified at macroscopic level?
5. Identify the group and valency of the element having atomic number 119. Also, predict the outermost electronic configuration and write the general formula of its oxide.

6. Among the elements B, Al, C and Si,

(i) which element has the highest first ionisation enthalpy?

(ii) which element has the most metallic character? Justify your answer in each case.

7.Nickel atom can lose two electrons to form Ni²+ ion. The atomic number of nickel is 28. From which orbital will nickel lose two electrons?

8. What is the number of photons of light with wavelength 4000 pm which provide 1 Joule of energy ?

**9. Yellow light emitted from a sodium lamp has a wavelength (λ) of 580 nm. Calculate the frequency (ν) and wavenumber (ν ) of the yellow light.**

10. 45.4 L of dinitrogen reacted with 22.7 L of dioxygen and 45.4 L of nitrous oxide was formed. The reaction is given below:

2N2(g) + O2(g) → 2N2O(g)

Which law is being obeyed in this experiment? Write the statement of the law.

11. Consider the following species:

N3-, O2-, F–, Na+, Mg2+, Al3+

(a) What is common in them?

(b) Arrange them in order of increasing ionic radii?

 12. Illustrate by taking examples of transition elements and non-transition elements that oxidation states of elements are largely based on electronic configuration.

13. Why does type of overlap given in the following figure not result in bond formation?

14. Define Octet rule. Write its significance and limitations.

15. Arrange the bonds in order of increasing ionic character in the molecules: LiF, K2O, N2, SO2 and ClF3.

16. Write the atomic number of halogen group elements.  
Write its electronic configuration.

17. The energy of σ2pz molecular orbital is greater than π2px and π2py molecular orbitals in nitrogen molecule. Write the complete sequence of energy levels in the increasing order of energy in the molecule. Compare the relative stability and the magnetic behaviour of the following species: N2, N2+ , N2– , N22+

18. The distance between two successive peaks or troughs of a wave is defined as its wavelength. So λ = 4 × 2.16 pm = 8.64 pm.

Calculate the mass per cent of calcium, phosphorus and oxygen in calcium phosphate Ca3(P04)2.

19. Hydrogen gas is prepared in the laboratory by reacting dilute HCI with granulated zinc.

First member of each group of representative elements (i.e., s and p-block elements) shows anomalous behaviour. Illustrate with two examples.

20. List out the radiations are in EMR.

21. The increasing order of reactivity among group 1 elements is Li < Na < K < Rb < Cs whereas that of group 17 is F > Cl > Br > I. Explain?

22. How would you explain the fact that the first ionization enthalpy of sodium is lower than that of magnesium but its second ionization enthalpy is higher than that of magnesium?

23. What is meant by hybridisation of atomic orbitals? Describe the shapes of sp, sp2, sp3 hybrid orbitals.

24. Table-tennis ball has a mass of 10 g and a speed of 90 m/s. If speed can be measured with an accuracy of 4% what will be the uncertainty in speed and position?

25. If 4 g of NaOH dissolves in 36 g of H2O, calculate the mole fraction of each component in the solution. Also, determine the molarity of solution (specific gravity of solution is 1g ml-1)

26. Discuss the shape of the following molecules using the VSEPR model:

BeCl2, BCl3, SiCl4, AsF5, H2S, PH3

27. Calculate the total number of angular nodes and radial nodes present in the 3p orbital.

28. Which among the following will not show deflection from the path on passing through the electric field? Proton, cathode rays, electron, neutron

29. The effect of the uncertainty principle is quite significant only for the motion of microscopic particles and is negligible for the given macroscopic particles. Explain the statement with the help of a suitable example.

30.Explain why PCl5 is trigonal bipyramidal whereas IF5 is square pyramidal.

HNO2, NO2

**LONG ANSWER TYPE QUESTIONS:**

1. Neon gas is generally used in sign boards. If it emits strongly at 616 nm, calculate :  
   (a) frequency of emission (b) energy of quantum (c) number of quanta present if it produces 2 J of energy.
2. The longest wavelength doublet absorption transition is observed at 589 nm and 589.6 nm. Calculate the frequency of each transition and energy difference between two excited states.
3. What is the photoelectric effect? State the result of a photoelectric effect experiment that could not be explained on the basis of laws of classical physics. Explain this effect on the basis of quantum theory of electromagnetic radiation.
4. What do you understand the tern isoelectronic species?

Name any 4 species that will be isoelectronic with each of the followings

### (i) F- (ii) Ar (iii) Mg2+ (iv) Rb +

1. The increasing order of reactivity among group 1 elements is Li < Na < K < Rb < Cs whereas that of group 17 is F > Cl > Br > I. Explain?
2. Define ionisation enthalpy. Discuss the factors affecting ionisation enthalpy of the elements and its trends in the periodic table.
3. Define the bond-length.
4. Write the favourable factors for the formation of ionic bond.
5. Define Octet rule. Write its significance and limitations.