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# CHEMISTRY - XI

## Language of Chemistry

1. What are molecules and compounds? Give two examples of radicals with valency one two and three.
2. What are atomic number and atomic mass?
3. What is a molecular formulae? Write the molecular formula of following compound.
   (a) potassium chlorate (b) sodium dichromate
   (c) calcium chromate (d) potassium permanganate
   (e) magnesium sulphate (f) ammonium phosphate
   (g) aluminium sulphide (h) strontium carbonate
   (i) Sodium thiosulphate
4. What information can you obtain from the symbol $^{39}_{19}K$?
5. How many electrons , protons and neutrons are present in the symbol $^{27}_{13}Al^{+3}$ ?
6. Balance the following
   (a) $FeCl_3 + H_2 \rightarrow FeCl_2 + HCl$
   (b) $Cu + H_2SO_4 \rightarrow CuSO_4 + SO_2 + H_2O$
   (c) $AlN + H_2O \rightarrow Al(OH)_3 + NH_3$
   (d) $Al_4C_3 + H_2O \rightarrow Al(OH)_3 + CH_4$
7. Balance the following equations
   (a) $KMnO_4 + HCl \rightarrow KCl + MnCl_2 + H_2O + Cl_2$
   (b) $K_2Cr_2O_7 + H_2SO_4 \rightarrow K_2SO_4 + Cr_2(SO_4)_3 + H_2O + O_2$
   (c) $Na_2Cr_2O_7 + H_2SO_4 + H_2S \rightarrow Na_2SO_4 + Cr_2(SO_4)_3 + H_2O + S$
   (d) $Zn + HNO_3 \rightarrow Zn(NO_3)_2 + H_2O + N_2O$
   (e) $Cu + H_2SO_4 \rightarrow CuSO_4 + H_2O + SO_2$
   (f) $Cl_2 + NaOH \rightarrow NaCl + NaClO + H_2O$
   (g) $KI + H_2SO_4 \rightarrow K_2SO_4 + H_2O + SO_2 + I_2$
8. What are radicals? Write the name of fifteen different radicals with their valency and symbols.

## Atomic Structure

1. What is an atom? what are subatomic particles? Name them. Make a table to show the mass, charge and location of these sub-atomic particles in an atom.
2. How was electron discovered?
3. With proper diagram show the Ruthordford gold foil experiment. Mention the observations and the conclusion he made.
4. What observations led Ruthordford to make following conclusion.
   i) The atomic centre is positively charged.
   ii) Most of the atomic space is hollow.
   iii) The positive nucleus in an atom is very small.
5. Explain Rutherford atomic model and how did he explain the atomic stability?
6. What are the drawbacks of Ruthordford's atomic model?
7. What are the postulates of Bohr's atomic model? How did it correct the drawbacks of Ruthordford's atomic model?
8. What are atomic spectra? How does Bohr's atomic model explain the origin of hydrogen spectrum?
9. What is hydrogen spectrum? Sketch and name various spectral series observed in the atomic spectrum of hydrogen?
10. what are the limitations of Bohr's atomic model?
11. Which principle that goes against the concept of bohr's fixed orbit? State the principle?
12. Name the spectral series which appears in visual part of the electromagnetic spectrum. How is such series originated?
13. Write short notes on Heisenberg's uncertainty principle and DeBroglie's equation.
14. What is an atomic orbital? What are shape of s and p-orbitals?
15. What is a quantum number? Mention the significance of four quantum numbers.
16. What is principle quantum number and what is it's significance?
17. What are azimuthal and magnetic quantum numbers? what do they signify?
18. State the Pauli exclusion principle, Hund's rule and Aufdau principle?
19. Give the electronic configuration of Cu(29) broming (Br = 35), chromium (Cr = 24), $Fe^{+2}$(26) and $Cl^-$ (17) is terms of orbitals.
20. An atomic orbital has n = 3 what are the possible value of l and m?
21. What are the values for n, l, m for $2p_x^1$ $3s^1$ and $3d^1$ orbitals?

# NON-METALS

## Hydrogen

1. What are H, $H^+$, $H^-$ and $H_2$?
2. What are isotopes? Write all isotopes of hydrogen and mention any two uses of these isotopes. Mention the isotope that contains no neutron.
3. Differentiate between ortho and para hydrogen.
4. Define nascent hydrogen. Write any two chemical reaction to show that nascent hydrogen is more powerful reducing agent than molecular hydrogen.
5. Mention an important use of each of the following.
   - Most abundant isotopes of hydrogen
   - Hydrogen gas
   - Deuterium
6. Compare between nascent hydrogen and atomic hydrogen. Which is more reactive and why?
7. What happens when zinc dust is added on hot potassium nitrate solution made alkaline with potassium hydroxide?
8. Give two reaction to show that water contains hydrogen gas?
9. When water is passed through red hot coke, a mixture of two gases is produced. Name the gas and write the equation involves.
10. What is heavy water and mention important application of it?

## Oxygen

1. What are oxides? How are oxide classified?
2. Classify the following oxides with reasons:
   $Na_2O$, CaO, MgO, BaO, $NO_2$, $N_2O_5$, $CO_2$, $SO_2$, $SO_3$, ZnO, $Al_2O_3$, SnO, $H_2O$, $H_2O_2$, CO, NO, $N_2O$, $Na_2O_2$, $BaO_2$, FeO, $Fe_2O_3$, $Pb_3O_4$, $I_2O_5$ and $P_2O_5$
3. What are peroxides? Give one example of it. What is the oxidation number of oxygen in peroxide.
4. Name the allotropes of oxygen and give an important use of it.
5. Name any two neutral oxide and give their molecular formula.
6. Mention an important use of the following.
   Heavy water, ozone layer, allotrope of oxygen, amphoteric oxide, and neutral oxide

## Ozone

1. Write the balanced chemical equation for the preparation of ozone from oxygen? What do you mean by tailing of mercury?
2. Write the resonating structure of ozone.
4. What are CFCs? How do they deplete the ozone layer?
5. Write the action of ozone as (a) an oxidant (b) a bleaching agent and (c) an additive
6. How is ozone layer being formed in stratosphere?
7. Write down the effects of ozone layer depletion.
8. What happens when:
   (i) Silent electric discharge is passed through the pure and dry oxygen
   (ii) mercury is exposed to ozonized atmosphere

## Nitrogen

1. How can you manufacture nitric acid by Ostwold's process? Write the nitric acid. Write the actioni for $HNO_3$ with (a) Pu (b) Hg (c) HI
2. How can ion manufacture ammonia gas by Haber's process? Show that $NH_3$ is basic in nature 1773.
3. How can you confirm the presence of nitric ion in the given sample. Write with the reaction involved.
4. The colour of nitric acid is brown when exposed to sun light. How, show the reaction inverted. (2m)
5. What is aqvareg i? How can it dissolve the noble metals like gold and platinum (5 m).

## Metallurgy

1. Distinguish between minerals and oreis.
2. Describe the general metallurgical process.