

CHEMISTRY STUDY MATERIALS FOR CLASS 12

(NCERT INTEXT QUESTIONS –ANSWERS)

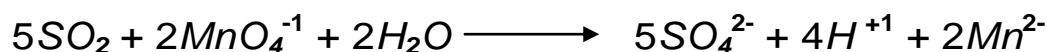
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THE P-BLOCK ELEMENTS

Question 22: How is the presence of SO_2 detected?

Solution 22: SO_2 is a colourless and pungent smelling gas. It can be detected with the help of potassium permanganate solution. When SO_2 is passed through an acidified potassium permanganate solution, it decolorizes the solution. as it reduces MnO_4^{-1} ions to Mn^{2+} ions.



Question 23: Mention three areas in which H_2SO_4 plays an important role?

Solution 23: Sulphuric acid is an important industrial chemical and is used for a lot of purposes. Some important uses of sulphuric acid are given below.

- (i) It is used in fertilizer industry. It is used to make various fertilizers such as ammonium sulphate and calcium super phosphate.
- (ii) It is used in the manufacture of pigments, paints, and detergents.
- (iii) It is used in the manufacture of storage batteries.

Question 24: Write the conditions to maximize the yield of H_2SO_4 by Contact process.

Solution 24: Manufacture of sulphuric acid by Contact process involves three steps.

1. Burning of ores to form SO_2
2. Conversion of SO_2 to SO_3 by the reaction of the former (V_2O_5 is used in this process as a catalyst.)
3. Absorption of SO_3 in H_2SO_4 to give Oleum ($H_2S_2O_7$)

The key step in this process is the second step. In this step, two moles of gaseous reactants combine to give one mole of gaseous product. Also, this reaction is exothermic. Thus, in accordance with Le Chatelier's principle, to obtain the SO_3 gas, maximum amount of temperature should be low and pressure should be high.

Question 26: Considering the parameters such as bond dissociation enthalpy, electron gain enthalpy and hydration enthalpy, compare the oxidizing power of F_2 and Cl_2 .

Solution 26: Fluorine is a much stronger oxidizing agent than chlorine. The oxidizing power depends on three factors.

- (i) Bond dissociation energy
- (ii) Electron gain enthalpy
- (iii) Hydration enthalpy

The electron gain enthalpy of chlorine is more negative than that of fluorine. However, the bond dissociation energy of fluorine is much lesser than that of chlorine. Also, because of its small size, the hydration energy of fluorine is much higher than that of chlorine. Therefore, the latter two factors more than compensate for the less negative electron gain enthalpy of fluorine. Thus, fluorine is a much stronger oxidizing agent than chlorine.

Question 27: Give two examples to show the anomalous behaviour of fluorine.

Solution 27: Anomalous behaviour of fluorine

- (i) It forms only one oxoacid as compared to other halogens that form a number of oxoacids.
- (ii) Ionization enthalpy, electronegativity. And electrode potential of fluorine are much higher than expected.

Question 28: Sea is the greatest source of some halogens. Comment.

Solution 28: Sea water contains chlorides, bromides, and iodides of Na, K, Mg, and Ca. However, it primarily contains NaCl. The deposits of dried up sea beds contain sodium chloride and carnalities, KCl , $MgCl_2$, $6H_2O$. Marine life also contains iodine in their systems. For example, sea weeds contain up-to 0.5% iodine as sodium iodide. Thus, sea is the greatest source of halogens.

Question 29: Give the reason for bleaching action of Cl_2 .

Solution 28: When chlorine reacts with water, it produces nascent oxygen. This nascent oxygen then combines with the coloured substances present in the organic matter to oxidize them into colourless substances.



Coloured substances + [O] \longrightarrow Oxidized colourless substance

Question 30: Name two poisonous gases which can be prepared from chlorine gas.

Solution 30: Two poisonous gases that can be prepared from chlorine gas are

- (i) Phosgene ($COCl_2$) (ii) Mustard gas ($ClCH_2CH_2SCH_2CH_2Cl$)

Question 31: Why is ICl more reactive than I_2 ?

Solution 31: ICl is more reactive than I_2 because I-Cl bond in ICl is weaker than I-I bond in I_2 .

Question 32: Why is helium used in diving apparatus?

Solution 32: Air contains a large amount of nitrogen and the solubility of gases in liquids increases with increase in pressure. When sea divers dive deep into the sea, large amount of nitrogen dissolves in their blood. When they come back to the surface, solubility of nitrogen decreases and it separates from the blood and forms small air bubbles. This leads to a dangerous medical condition called bends. Therefore, air in oxygen cylinders used for diving is diluted with helium gas. This is done as He is sparingly less soluble in blood.

Question 33: Balance the following equation: $XeF_6 + H_2O \longrightarrow XeO_2F_2 + HF$

Solution 33: Balanced equation; $XeF_6 + H_2O \longrightarrow XeO_2F_2 + 4HF$

Question 34: Why has it been difficult to study the chemistry of radon?

Solution 34: It is difficult to study the chemistry of radon because it is a radioactive substance having a half- life of only 3.82 days, compounds of radon such as RnF_2 have not been isolated. They have only been identified.
