CHEMISTRY

BOOKS - U-LIKE CHEMISTRY (HINGLISH)

THE P-BLOCK ELEMENTS

Ncert Intext Questions

1. Why are pentahalides more covalent than trihalides?

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2. Why is BiH_3 the strongest reducing agent amongst all the hydrides of Group 15 elements ?

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3. Why is N_2 less reactive at room temperature ?

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4. Mention the conditions required to maximise the yield of ammonia.

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5. How does ammonia react with a solution of Cu^{2+} ?

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6. What is the covalence of nitrogen in N_2O_5 ?

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7. Bond angle in PH_4^+ is higher than that in PH_3. Why?

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8. What happens when white phosphorus is heated with concentrated NaOH solution in an

inert atmosphere of CO_2 ?

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9. What happens when PCl_5 is heated ?

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10. Write a balance equation of the hydrolytic reaction of PCl_5 in heavy water .

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11. What is the basicity of H_3PO_4 ?

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12. What happens when H_3PO_3 is heated ?

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13. List the important sources of sulphur .

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14. Write the order of thermal stability of the hydrides of Group 16 elements.

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15. Why is H_2O a liquid and H_2S a gas ?

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16. Which of the following does not react with oxygen directly?

Zn, Ti, Pt, Fe

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17. Complete the following reactions :

$C_2H_4 + O_2 \rightarrow$

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18. Complete the following reactions :

$4Al + 3O_2 \rightarrow$

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19. Why does O_3 act as a powerful oxidising agent ?

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20. How is O_3 estimated quantitatively?

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21. What happens when sulphur dioxide is passed through an aqueous solution of Fe(III) salt ?

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22. Comment on the nature of two S-O bonds formed in SO_2 molecule. Are the two S-O bonds in this molecule equal ?

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23. How is the presence of SO_2 detected ?

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24. Mention threee areas in which H_2SO_4 plays an important role.

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25. Write the conditions to maximise the yield of H_2SO_4 by Contact process.

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26. Why is $K_{a_2} < < K_{a_1}$ for H_2SO_4 in water ?

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27. Considering the parameters such as bond dissociation enthalpy, electron gain enthalpy and hydration enthalpy, compare the oxidising power of F_2 and Cl_2.

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28. Give two examples to show the anomalous behaviour of fluorine.

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29. Sea is the greatest source of some halogens. Comment.

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30. Give the reason for bleaching action of Cl_2

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31. Name two poisonous gases which can be prepared from chlorine gas.

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32. Why is ICl more reactive than I_2 ?

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33. Why is helium used in diving apparatus?

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34. Balance the following equations :

$XeF_6 + H_2O \rightarrow XeO_2F_2 + HF$

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35. Why has it been difficult to study the chemistry of radon?

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Ncert Textbook Exercises

1. Why does the reactivity of nitrogen differ from phosphorus ?

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2. Why does NH_4 form hydrogen bond but PH_3 does not ?

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3. How is nitrogen prepared in the laboratory ? Write the chemical equations of the reactions involved.

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4. How is ammonia manufactured industrially?

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5. Illustrate how copper metal can give different products on reaction with HNO_3

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6. Give the resonating structures of NO_2 and N_2O_5.

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7. The HNH angle value is higher than HPH, HAsH and HsbH angles. Why ?

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8. Why does R_3P = exist but R_3N= does not (R = alkyl group) ?

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9. Explain, why NH_3 is basic while BiH_3 is only feebly basic.

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10. Nitrogen exists as diatomic molecule and phosphorus as P_4.

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11. Write main differences between the properties of white phosphorus and red phosphorus.

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12. Why does nitrogen show catenation properties less than phosphorus ?

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13. Give the disproportionation reaction of H_3PO_3.

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14. Can PCl_5 act as an oxidising as well as a reducing agent ? Justify.

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15. Justify the placement of O, S, Se, Te and Po in the same group of the periodic table in terms of electronic configuration, oxidation, state and hydride formation.

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16. Why is dioxygen a gas but sulphur a solid ?

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17. Knowing the electron gain enthalpy values for $O \rightarrow O^{-}$ and $O \rightarrow O^{2-}$ as -141 and $702 kJ \ \text{mol}^{-1}$ respectively , how can you account for the formation of a large number of oxides having O^{2-} species and not O^{-} ?

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18. Which aerosols deplete ozone ?

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19. Describe the manufacture of H_2SO_4 by contact process

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20. How is SO_2 an air pollutant ?

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21. Why are halogens strong oxidising agents ?

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22. Explain why fluorine forms only one oxoacid, HOF.

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23. Explain why inspite of nearly the same electronegativity, oxygen forms hydrogen bonding while chlorine does not.

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24. Write two uses of ClO_2 .

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25. Why are halogens coloured ?

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26. Write the reactions of F_2 and Cl_2 with water.

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27. How can you prepare Cl_2 from HCl and HCl from Cl_2 ? Write reactions only .

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28. What inspired N. Bartlett for carrying out reaction between Xe and PtF_6 ?

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29. What are the oxidation states of phosphorous in the following :

(i) H_3PO_3 (ii) PCl_3 (iii) Ca_3P_2 (iv) Na_3PO_4 (v) POF_3 ?

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30. Write balanced equations for the following

:

$NaCl$ is heated with sulphuric acid in presence of MnO_2

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31. Write balanced equations for the following

:

Chlorine gas is passed into a solution of NaI in water .

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32. How are xenon fluorides XeF_2, XeF_4 and XeF_6 obtained ?

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33. With what neutral molecules is ClO^- isoelectronic ? Is that molecule a Lewis base ?

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34. How are XeO_3 and $XeOF_4$ prepared ?

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35. Arrange the following in the order of property indicated for set :

F_2, Cl_2, Br_2, I_2- increasing bond dissociation enthalpy .

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36. Arrange the following in the order of property indicated for set :

HF,HCl, HBr, HI - increasing acid strength.

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37. Arrange the following in the order of property indicated for set :

$NH_3, PH_3, AsH_3, SbH_3, BiH_3$ - increasing base strength .

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38. Which one of the following does not exist ?

(i) $XeOF_4$ (ii) NeF_2 (iii) XeF_4 (iv) XeF_6

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39. Give the formula and describe the structure of a noble gas species which is isostructrural with ICl_4^-

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40. Give the formula and describe the structure of a noble gas species which is isostructrural with IBr_2^-

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41. Give the formula and describe the structure of a noble gas species which is isostructrural with BrO_3^-

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42. Why do noble gases have comparatively large atomic sizes ?

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Case Based Source Based Integrated Questions

1. Read the given passage and answer the questions that follow :

Molecular nitrogen comprises 78% by volume of the atmosphere. In the earth's crust, it

occurs as sodium nitrate, $NaNO_3$ (called Chile saltpetre) and potassium nitrate (Indian saltpetre). It is found in the form of proteins in plants and animals. Phosphorus occurs in minerals of the apatite family, $Ca_9(PO_4)_6.CaX_2(X = F, Cl \text{ or } OH)$(for example, fluorapatite $Ca_9(PO_4)_6.CaF_2$) which are the main components of phosphate rocks. Phosphorus is an essential constituent of animal and plant matter. It is present in bones as well as in living cells. Phosphoproteins are present in milk and eggs. Arsenic, antimony and bismuth are found

mainly as sulphide minerals. Moscovium is a synthetic radioactive element. Its symbol is Mc, atomic number 115, atomic mass 289 and electronic configuration $[Rn]5f^{15}6d^{10}7s^{2}7p^{3}$. What is the difference between Indian saltpetre and Chile saltpetre?

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2. Read the given passage and answer the questions that follow :

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of the atmosphere. In the earth's crust, it occurs as sodium nitrate, $NaNO_3$ (called Chile saltpetre) and potassium nitrate (Indian saltpetre). It is found in the form of proteins in plants and animals. Phosphorus occurs in minerals of the apatite family, $Ca_9(PO_4)_6.CaX_2(X = F, Cl \text{ or } OH)$(for example, fluorapatite $Ca_9(PO_4)_6.CaF_2$) which are the main components of phosphate rocks. Phosphorus is an essential constituent of animal and plant matter. It is present in bones as well as in living cells. Phosphoproteins are present in milk and eggs.

Arsenic, antimony and bismuth are found mainly as sulphide minerals. Moscovium is a synthetic radioactive element. Its symbol is Mc, atomic number 115, atomic mass 289 and electronic configuration $[Rn]5f^{15}6d^{10}7s^{2}7p^{3}$. What is the composition of apatite family compounds ?

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3. Read the given passage and answer the questions that follow :

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Phosphoproteins are present in milk and eggs. Arsenic, antimony and bismuth are found mainly as sulphide minerals. Moscovium is a synthetic radioactive element. Its symbol is Mc, atomic number 115, atomic mass 289 and electronic configuration $[Rn]5f^{15}6d^{10}7s^{2}7p^{3}$. Name the natural substances that contain phosphorus.

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4. Read the given passage and answer the questions that follow :

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rocks. Phosphorus is an essential constituent of animal and plant matter. It is present in bones as well as in living cells. Phosphoproteins are present in milk and eggs. Arsenic, antimony and bismuth are found mainly as sulphide minerals. Moscovium is a synthetic radioactive element. Its symbol is Mc, atomic number 115, atomic mass 289 and electronic configuration $[Rn]5f^{15}6d^{10}7s^{2}7p^{3}$. Give the electronic configuration of Moscovium.

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5. Read the given passage and answer the questions that follow :

Molecular nitrogen comprises 78% by volume of the atmosphere. In the earth's crust, it occurs as sodium nitrate, $NaNO_3$ (called Chile saltpetre) and potassium nitrate (Indian saltpetre). It is found in the form of proteins in plants and animals. Phosphorus occurs in minerals of the apatite family, $Ca_9(PO_4)_6.CaX_2(X = F, Cl \text{ or } OH)$(for example, fluorapatite $Ca_9(PO_4)_6.CaF_2$) which are the main components of phosphate

rocks. Phosphorus is an essential constituent of animal and plant matter. It is present in bones as well as in living cells. Phosphoproteins are present in milk and eggs. Arsenic, antimony and bismuth are found mainly as sulphide minerals. Moscovium is a synthetic radioactive element. Its symbol is Mc, atomic number 115, atomic mass 289 and electronic configuration $[Rn]5f^{15}6d^{10}7s^{2}7p^{3}$. Give the names of third, fourth and fifth members of nitrogen family.

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6. Read the passage given below and answer the questions that follows:

Nitrogen differs from the rest of the members of this group due to its small size, high electronegativity, high ionisation enthalpy and non-availability of d-orbitals. Nitrogen has unique ability to form $p\pi - p\pi$ multiple bonds with itself and with other elements having small size and high electronegativity (For example, C, O). Heavier elements of this group do not form $p\pi - p\pi$ bonds as their atomic orbitals are so large and diffuse that they

cannot have effective overlapping. Thus, nitrogen exists as a diatomic molecule with a triple bond (one s and two p) between the two atoms. Consequently, its bond enthalpy (941.4 kJ mol^{-1}) is very high. On the contrary, phosphorus, arsenic and antimony form single bonds as P-P, As-As and Sb-Sb while bismuth forms metallic bonds in elemental state, However, the single N-N bond is weaker than the single P-P bond because of high interelectronic repulsion of the non-bonding electrons, owing to the small bond length.

Why does nitrogen differ from rest of the members of the Group ?

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7. Read the passage given below and answer the questions that follows:

Nitrogen differs from the rest of the members of this group due to its small size, high electronegativity, high ionisation enthalpy and non-availability of d-orbitals. Nitrogen has unique ability to form $p\pi - p\pi$ multiple bonds

with itself and with other elements having small size and high electronegativity (For example, C, O). Heavier elements of this group do not form $p\pi - p\pi$ bonds as their atomic orbitals are so large and diffuse that they cannot have effective overlapping. Thus, nitrogen exists as a diatomic molecule with a triple bond (one s and two p) between the two atoms. Consequently, its bond enthalpy (941.4 kJ mol^{-1}) is very high. On the contrary, phosphorus, arsenic and antimony form single bonds as P-P, As-As and Sb-Sb while bismuth forms metallic bonds in elemental state,

However, the single N-N bond is weaker than the single P-P bond because of high interelectronic repulsion of the non-bonding electrons, owing to the small bond length.

What kind of bond is formed in the molecule of nitrogen ?

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8. Read the passage given below and answer the questions that follows:

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Give two examples of compounds that nitrogen forms with oxygen using $p\pi - p\pi$ bond.

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9. Read the passage given below and answer the questions that follows:

Nitrogen differs from the rest of the members of this group due to its small size, high electronegativity, high ionisation enthalpy and non-availability of d-orbitals. Nitrogen has unique ability to form $p\pi - p\pi$ multiple bonds with itself and with other elements having small size and high electronegativity (For example, C, O). Heavier elements of this group do not form $p\pi - p\pi$ bonds as their atomic orbitals are so large and diffuse that they

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Heavier elements of Group 15 do not form $p\pi - p\pi$ bonds.

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10. Read the passage given below and answer the questions that follows:

Nitrogen differs from the rest of the members of this group due to its small size, high electronegativity, high ionisation enthalpy and non-availability of d-orbitals. Nitrogen has unique ability to form $p\pi - p\pi$ multiple bonds

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However, the single N-N bond is weaker than the single P-P bond because of high interelectronic repulsion of the non-bonding electrons, owing to the small bond length.

Why is the single N- N bond weaker than the single P - P bond ?

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11. Read the given passage and answer the questions that follow :

The anomalous behaviour of oxygen, like other

members of p-block present in second period is due to its small size and high electronegativity. One typical example of effects of small size and high electronegativity is the presence of strong hydrogen bonding in H_2O which is not found in H_2S. The absence of d-orbitals in oxygen limits its covalency to four and in practice, rarely exceeds two. On the other hand, in case of other elements of the group, the valence shells can be expanded and covalence exceeds four.

First element of the groups in p-block shows

anomalous behaviour from other elements of the group. Explain.

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12. Read the given passage and answer the questions that follow :

The anomalous behaviour of oxygen, like other members of p-block present in second period is due to its small size and high electronegativity. One typical example of effects of small size and high electronegativity

is the presence of strong hydrogen bonding in H_2O which is not found in H_2S. The absence of d-orbitals in oxygen limits its covalency to four and in practice, rarely exceeds two. On the other hand, in case of other elements of the group, the valence shells can be expanded and covalence exceeds four.

H_2O is a water at room temperature whereas H_2S is a gas.

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13. Read the given passage and answer the questions that follow :

The anomalous behaviour of oxygen, like other members of p-block present in second period is due to its small size and high electronegativity. One typical example of effects of small size and high electronegativity is the presence of strong hydrogen bonding in H_2O which is not found in H_2S. The absence of d-orbitals in oxygen limits its covalency to four and in practice, rarely exceeds two. On the other hand, in case of other elements of

the group, the valence shells can be expanded and covalence exceeds four.

Give the names of third and fourth members of the group to which O and S belong.

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14. Read the given passage and answer the questions that follow :

The anomalous behaviour of oxygen, like other members of p-block present in second period is due to its small size and high

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How can we expand the valency shell in the case of elements lying lower in the group of oxygen ?

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15. Read the given passage and answer the questions that follow :

The anomalous behaviour of oxygen, like other members of p-block present in second period is due to its small size and high electronegativity. One typical example of effects of small size and high electronegativity is the presence of strong hydrogen bonding in H_2O which is not found in H_2S. The absence of d-orbitals in oxygen limits its covalency to four and in practice, rarely exceeds two. On

the other hand, in case of other elements of the group, the valence shells can be expanded and covalence exceeds four.

Name the fifth member of the group of oxygen.

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16. Read the given passage and answer the questions that follow :

Fluorine and chlorine are fairly abundant while bromine and iodine less so. Fluorine is present

mainly as insoluble fluorides [fluorspar, CaF_2, crylolite Na_3AlF_6, and fluoroapatite $3Ca_3(PO_4)2.CaF2$] and small quantities are present in soil, river water plants and bones and teeth of animals. Sea water contains chlorides, bromides and iodides of sodium, potassium, magnesium and calcium, but is mainly sodium chloride solution (2.5% by mass). The deposits of dried up seas contain these compounds, for example, sodium chloride and carnallite,$KCl.MgCl_{2.6}H_2O$. Certain forms of marine life contain iodine in their systems, various seaweeds, for example,

contain upto 0.5% of iodine and Chile saltpetre contains upto 0.2% of sodium iodate. Tennessine is a synthetic radioactive element. Its symbol is Ts, atomic number 117, atomic mass 294 and electronic configuration $[Rn]5f^{14}6d^{10}7s^{2}7p^{5}$.

Name the elements of Group 17 of the Periodic Table.

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17. Read the given passage and answer the questions that follow :

Fluorine and chlorine are fairly abundant while bromine and iodine less so. Fluorine is present mainly as insoluble fluorides [fluorspar, CaF_2, crylolite Na_3AlF_6, and fluoroapatite $3Ca_3(PO_4)2.CaF2$] and small quantities are present in soil, river water plants and bones and teeth of animals. Sea water contains chlorides, bromides and iodides of sodium, potassium, magnesium and calcium, but is mainly sodium chloride solution (2.5% by

mass). The deposits of dried up seas contain these compounds, for example, sodium chloride and carnallite,$KCl.\ MgCl_{2.6}H_2O$. Certain forms of marine life contain iodine in their systems, various seaweeds, for example, contain upto 0.5% of iodine and Chile saltpetre contains upto 0.2% of sodium iodate. Tennessine is a synthetic radioactive element. Its symbol is Ts, atomic number 117, atomic mass 294 and electronic configuration $[Rn]5f^{14}6d^{10}7s^27p^5$.

Name the main substances in the deposits of dried up seas.

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18. Read the given passage and answer the questions that follow :

Fluorine and chlorine are fairly abundant while bromine and iodine less so. Fluorine is present mainly as insoluble fluorides [fluorspar, CaF_2, crylolite Na_3AlF_6, and fluoroapatite $3Ca_3(PO_4)2.CaF2$] and small quantities are present in soil, river water plants and bones and teeth of animals. Sea water contains chlorides, bromides and iodides of sodium,

potassium, magnesium and calcium, but is mainly sodium chloride solution (2.5% by mass). The deposits of dried up seas contain these compounds, for example, sodium chloride and carnallite,$KCl.\ MgCl_{2.6}H_2O$. Certain forms of marine life contain iodine in their systems, various seaweeds, for example, contain upto 0.5% of iodine and Chile saltpetre contains upto 0.2% of sodium iodate. Tennessine is a synthetic radioactive element. Its symbol is Ts, atomic number 117, atomic mass 294 and electronic configuration $[Rn]5f^{14}6d^{10}7s^27p^5$.

Name the last element of Group 17, its atomic mass and electronic configuration.

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19. Read the given passage and answer the questions that follow :

Fluorine and chlorine are fairly abundant while bromine and iodine less so. Fluorine is present mainly as insoluble fluorides [fluorspar, CaF_2, crylolite Na_3AlF_6, and fluoroapatite $3Ca_3(PO_4)2. CaF2$] and small quantities are

present in soil, river water plants and bones and teeth of animals. Sea water contains chlorides, bromides and iodides of sodium, potassium, magnesium and calcium, but is mainly sodium chloride solution (2.5% by mass). The deposits of dried up seas contain these compounds, for example, sodium chloride and carnallite,$KCl.\ MgCl_{2.6}H_2O$. Certain forms of marine life contain iodine in their systems, various seaweeds, for example, contain upto 0.5% of iodine and Chile saltpetre contains upto 0.2% of sodium iodate. Tennessine is a synthetic radioactive

element. Its symbol is Ts, atomic number 117, atomic mass 294 and electronic configuration $[Rn]5f^{14}6d^{10}7s^27p^5$.

Write the formula of fluorapatite.

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Multiple Choice Questions

1. Zinc reacts with dilute HNO_3 to evolve

A. N_2O

B. NO

C. NO_2

D. N_2O_5

Answer: A

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2. Which allotropic form of phosphorus is used in the preparation of phosphine ?

A. Red phosphorus

B. Black phosphorus

C. White phosphorus

D. Yellow phosphorus

Answer: C

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3. The formula for hypochlorous acid is

A. HOCl

B. $HOClO$

C. $HOClO_2$

D. $HOClO_3$

Answer: A

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4. Aqua regia has the composition :

A. 1 part conc. $HNO_3 + 2$ parts conc. HCl

B. 1 part conc. $HNO_3 + 3$ parts conc. HCl

C. 1 part conc. HNO_3 + 1 part conc. HCl

D. 2 parts conc. $HNO_3 + 3$ parts conc. HCl

Answer: B

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5. XeO_3 has the structure

A. square

B. square pyramidal

C. pyramidal

D. distorted octahedral

Answer: C

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6. In going down from top to bottom in Group 16.

A. Stability of +6 oxidation state decreases and that of +4 increases.

B. Stability of both +6 and +4 oxidation state increases.

C. Stability of both +6 and +4 oxidation state decreases.

D. Stability of +6 oxidation state increases and that of +4 decreases.

Answer: A

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7. Which of the following oxygen containing salts on heating will not produce oxygen ?

A. Chlorates

B. Sulphates

C. Nitrates

D. Permanganates

Answer: B

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8. The formula for carnallite is

A. $KCl.\ MgCl_2.\ 6H_2O$

B. $K_2SO_4.\ MgSO_4.\ 6H_2O$

C. $KBr.\ MgBr_2.\ 6H_2O$

D. $KCl.\ MgCl_2.\ 4H_2O$

Answer: A

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9. Composition of bleaching powder is

A. $Ca(OCl)_2.\ CaCl_2.\ Ca(OH)_2.\ H_2O$

B. $Ca(OCl)_2.\ CaO.\ Ca(OH)_2$

C. $Ca(OCl_2)_2.CaO.Ca(OH)_2.H_2O$

D. $Ca(OCl)_2.CaCl_2.Ca(OH)_2.2H_2O$

Answer: D

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10. The molecule XeF_6 has the following structure :

A. square pyramidal

B. Pyramidal

C. distorted octahedral

D. Square planar

Answer: C

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11. Atomic numbers of Ar and Xe respectively are

A. 36 and 54

B. 18 and 54

C. 10 and 36

D. 10 and 54

Answer: B

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12. A molecule of sulphur may be represented as

A. S

B. S_2

C. S_4

D. S_8

Answer: D

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13. Anomalous behaviour of oxygen in group 16 is due to

A. combustible nature.

B. its support for combustion.

C. its gaseous state.

D. small size and high electronegativity.

Answer: D

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14. Fluorspar, cryolite and fluoroapatite are the minerals containing

A. P

B. Cl

C. F

D. Ba

Answer: C

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15. Noble gases have

A. high ionisation enthalpy and more negative electron gain enthalpy.

B. low ionisation enthalpy and more negative electron gain enthalpy.

C. high ionisation enthalpy and more positive electron gain enthalpy.

D. low ionisation enthalpy and more positive electron gain enthalpy.

Answer: C

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16. Hydrogen bond is formed in HF due to

A. small size and low electronegativity of F.

B. small size and high electronegativity of F.

C. big size and high electronegativity of F.

D. big size and low electronegativity of F.

Answer: B

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17. Which is the last member of Group 17 ?

A. Iodine

B. Astatine

C. Tennessine

D. None of these

Answer: C

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18. Bond dissociation enthalpy of the halogens shows the trend

A. $F-F<Cl-Cl>Br-Br>I-I$

B. $F-F>Cl-Cl>Br-Br>I-I$

C. $F-F>Cl-Cl<Br-Br>I-I$

D. $F-F>Br-Br>Cl-Cl>I-I$

Answer: A

View Text Solution

19. The structure of ClF_5 molecule is

A. square pyramidal.

B. pentagonal bipyramidal.

C. bent T-shaped.

D. trigonal bipyramidal.

Answer: A

View Text Solution

20. Noble gases have

A. low melting points and low solubility in water.

B. low melting points and high solubility in water.

C. high melting points and low solubility in water.

D. high melting points and high solubility in water.

Answer: A

View Text Solution

21. Which of the following is not colourless crystalline solids and does not sublime readily at 298 K ?

A. XeF_2

B. XeO_3

C. XeF_4

D. XeF_6

Answer: B

View Text Solution

22. Which of the following gases is used for providing incrt atmosphere for filling electric bulbs?

A. Argon

B. Helium

C. Neon

D. Xenon

Answer: A

View Text Solution

Assertion Reason Questions

1. Assertion (A) : Nitrogen has a tendency to form $p\pi - p\pi$ bond with itself giving rise to the formation of N_2.

Reason (R) : Bond enthalpy of N_2 is extremely high.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is

the correct explanation of the Assertion (A)

B. Both Assertion (A) and Renson (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A)

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: A

View Text Solution

2. Assertion (A) : β-Black phosphorus is formed when red phosphorus is heated in a sealed tube at 803 K.

Reason (R) : Phosphine is a colourless gas with rotten fish smell and is highly poisonous.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is

the correct explanation of the Assertion (A)

B. Both Assertion (A) and Renson (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A)

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: D

View Text Solution

3. Assertion (A): Hydrolysis of XeF_4 and XeF_6 with water gives XeO_3.

Reason (R) : The structures of the three Xenon fluorides can be deduced from VSEPR.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is

the correct explanation of the Assertion (A)

B. Both Assertion (A) and Renson (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A)

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: B

View Text Solution

4. Assertion (A) : Helium is used in diving apparatus.

Reason (R) : Argon is used in discharge tubes and fluorescent bulbs for advertisement display.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is

the correct explanation of the Assertion (A)

B. Both Assertion (A) and Renson (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A)

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: C

View Text Solution

5. Assertion (A) : All the noble gases have ns^2np^6 electronic configuration in their valence shell.

Reason (R) : Atomic radii increase down with increase in atomic number.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is

the correct explanation of the Assertion (A)

B. Both Assertion (A) and Renson (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A)

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: D

View Text Solution

6. Assertion (A) : Noble gases have very low boiling points.

Reason (R) : Noble gases being monoatomic have no intermolecular forces except weak dispersion forces.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is

the correct explanation of the Assertion (A)

B. Both Assertion (A) and Renson (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A)

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: A

View Text Solution

7. Assertion (A) : Burning of sulphur or sulphide ore generates SO_2.

Reason (R) : Rhombic sulphur is insoluble in water but dissolves readily in CS_2.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is

the correct explanation of the Assertion (A)

B. Both Assertion (A) and Renson (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A)

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: B

View Text Solution

8. Assertion (A): The stability of -2 oxidisation state in Group 16 decreases down the Group.

Reason (R) : The anomalous behaviour of oxygen is due to its large size and low electronegativity.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is

the correct explanation of the Assertion (A)

B. Both Assertion (A) and Renson (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A)

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: C

View Text Solution

9. Assertion (A): The large difference between the melting and boiling points of oxygen and sulphur may be explained on the basis of their atomicity.

Reason (R) : Oxygen gas can be obtained by heating salts such as chlorates, nitrates and permanganates.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A)

B. Both Assertion (A) and Renson (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A)

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: B

View Text Solution

10. Assertion (A): Electrolysis of water leads to release of hydrogen at the anode and oxygen at the cathode.

Reason (R) : All elements of Group 16 except oxygen form dischlorides and dibromides.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A)

B. Both Assertion (A) and Renson (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A)

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: D

View Text Solution

11. Assertion (A) : Ozone is prepared from oxygen in a silent electrical dicharge.

Reason (R) : Formation of ozone from oxygen is an endothermic process.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A)

B. Both Assertion (A) and Renson (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A)

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: A

View Text Solution

12. Assertion (A) : Industrially, sulphur dioxide is produced as a byproduct of roasting of sulphide ores.

Reason (R) : In the reaction of SO_2 with water

and alkalies, the behaviour of SO_2 is very similar to that of CO_2.

A. Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A)

B. Both Assertion (A) and Renson (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A)

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement.

Answer: C

View Text Solution

Fill In The Blanks

1. Metals like Cr and Al do not dissolve in concentrated nitric acid because of the formation of a_____ film of oxide on the surface.

View Text Solution

2. The formula for copper pyrites is _____

View Text Solution

3. At elevated temperatures, S_2 is the dominant species and is _____like O_2

View Text Solution

4. The elements of Group 16 are oxygen, sulphur, _____,tellurium and polonium

View Text Solution

5. Chlorine water on standing loses its yellow colour due to the formation of _____and _____

View Text Solution

6. Chlorine, bromine and iodine form oxides in which the oxidation states of these halogens range from _____

View Text Solution

7. $[Kr]4d^{10}5s^{2}5p^{4}$ is the electronic configuration of _____.

View Text Solution

8. Fluorspar and cryolite have the formula _____ and _____ respectively.

View Text Solution

9. Because of the compact nature of oxygen atom, it has _____ electron gain enthalpy than sulphur.

View Text Solution

10. A nation's industrial strength can be judged by the quantity of _____ its produces and consumes.

View Text Solution

True Or False

1. The valence shell electronic configuration of Group 15 elements is ns^2np^2 ?

View Text Solution

2. The elements of Group 16 have ns^2np^3 general electronic configuration in the outermost shell.

View Text Solution

3. Helium is an inflammable and light gas.

View Text Solution

4. XeF_2 has a bent shape.

View Text Solution

5. Most of the reactions of F_2 are endothermic due to small and strong bond formed by it with other elements.

View Text Solution

Very Short Answer Questions

1. What is the basicity of H_3PO_4 ?

View Text Solution

2. Write the formulae of any two oxoacids of sulphur.

View Text Solution

3. Which allotrope of sulphur is thermally stable at room temperature ?

View Text Solution

4. Name two poisonous gases which can be prepared from chlorine gas.

View Text Solution

5. Which is a stronger reducing agent, SbH_3 or BiH_3, and why?

View Text Solution

6. Which one of PCl_4^+ and PCl_4^- is not likely to exist and why ?

View Text Solution

7. Draw the structure of XeF_2 molecule.

View Text Solution

8. Draw the structure of XeF_4 molecule.

View Text Solution

9. Arrange F_2, Cl_2, Br_2 and I_2 in the order of increasing bond dissociation enthalpy.

View Text Solution

10. Why does NO_2 dimerise ?

View Text Solution

11. Fluorine does not exhibit any positive oxidation state. Why?

View Text Solution

12. What is the covalence of nitrogen in N_2O_5 ?

View Text Solution

13. Why is Bi (V) a stronger oxidant than Sb (V)?

View Text Solution

14. In which one of the following two structures NO_2^+ and NO_2^- the bond angle has a higher value ?

View Text Solution

15. Why is bond angle in PH_3 molecule lesser than in NH_3 ?

View Text Solution

16. Assign reason for the following: In solid state, PCl_5 behaves as an ionic species.

View Text Solution

17. Draw the structure of XeF_2 molecule.

View Text Solution

18. Give reason for the following:

Among the noble gases only xenon is well known to form chemical compounds.

View Text Solution

19. Why do noble gases form compounds with oxygen and fluorine only ?

View Text Solution

20. Complete the following chemical equation :

$XeF_4 + H_2O \rightarrow$

View Text Solution

21. Write one chemical equation to show that SO_2 acts as a reducing agent.

View Text Solution

22. Write one chemical equation to show that chlorine gas can be obtained from bleaching powder.

View Text Solution

23. Write one chemical reaction equation to show that conc. H_2SO_4 is a strong oxidising agent.

View Text Solution

24. Give a chemical equation or name of the reaction to support the following statement : Sodium chlorate $(NaClO_3)$ is an oxidant.

View Text Solution

25. Give chemical evidence for the following:

Fluorine is a stronger oxidising agent than chlorine.

View Text Solution

26. Which of the two is more covalent: $SbCl_3$ and $SbCl_5$?

View Text Solution

27. Draw the structure of the following species BrO_4^-.

View Text Solution

28. Write the chemical equation for the reactions which occur when sodium iodate $[NaIO_3]$ is reduced with sodium hydrogen sulphite.

View Text Solution

29. Draw the structure of XeF_4.

View Text Solution

30. What type of hybridisation is associated with N in NH_3 ? What is the expected bond angle in NH_3 ?

View Text Solution

31. Which is the strongest oxidising agent among ClO_4^-, BrO_4^- and IO_3^- ?

View Text Solution

32. Name one ion whose central atom has the sp^3d^3 type of hybrid orbitals

View Text Solution

33. Why is bond dissociation energy of fluorine molecule less than that of chlorine molecule ?

View Text Solution

34. Which name is given to the elements which are neither metals nor non-metals ?

View Text Solution

35. Account for the following:

Tendency to show -2 oxidation state diminishes from sulphur to polonium in Group 16.

View Text Solution

36. Why is H_2S more acidic than water ?

View Text Solution

37. Why is H_2S, with greater molar mass, a gas, while water a liquid at room temperature ?

View Text Solution

38. Noble gases are mostly chemically inert. Give reason.

View Text Solution

39. Nitrogen does not form pentahalides. Give reason.

View Text Solution

40. Complete and balance the chemical equation :

$BrO_3^- + F_2 + OH^- \rightarrow$

View Text Solution

41. Which compound led to the discovery of compounds of noble gases ?

View Text Solution

42. Give reason for the difference in the following:

Reactivity of nitrogen and phosphorus.

View Text Solution

43. Draw the structure of xenon fluoride molecule which is isoelectronic with IF_5.

View Text Solution

44. Nitrogen and phosphorus are elements in the same group but property of catenation is shown only by phosphorus, why?

View Text Solution

45. Fluorine provides the largest variety of interhalogen compounds among halogens, why?

View Text Solution

46. Which has the larger bond angle H_2S or H_2O and why ?

View Text Solution

47. Draw and name the molecular shape of SF_6.

View Text Solution

48. PCl_5 acts as an oxidising agent. Justify .

View Text Solution

49. Why are fluorine and oxygen compounds more aptly called oxygen fluoride ?

View Text Solution

50. Give the reason which prompted Bartlett to prepare first noble gas compound.

View Text Solution

51. What is the difference between nature of pi -bonds present in H_3PO_3 and HNO_3 molecules ?

View Text Solution

52. Give reason for the following:

PH_3 is a weaker base than NH_3

View Text Solution

53. Mention one property of hydrazine.

View Text Solution

54. On being slowly passed through water, PH_3 forms bubbles but NH_3 dissolves. Why is it so ?

View Text Solution

55. Bond enthalpy of fluorine is lower than that of chlorine. Why?

View Text Solution

56. Answer the following question :

Why is it that nitrogen exists as gas whereas phosphorus exists as a solid ?

View Text Solution

57. Name the state of hybridisation of orbitals in XeF_2 molecule.

View Text Solution

58. In the preparation of H_2SO_4 by contact process, why is SO_3 not absorbed directly in water to form H_2SO_4 ?

View Text Solution

59. Write the balanced chemical equation for the reaction showing catalytic oxidation of NH_3 by atmospheric oxygen.

View Text Solution

60. Write the structure of pyrophosphoric acid.

View Text Solution

61. PH_3 forms bubbles when passed slowly in water but NH_3 dissolves. Explain why ?

View Text Solution

62. Give reason to explain why ClF_3 exists but FCl_3, does not.

View Text Solution

63. Write an example of a neutral molecule which is isoelectronic with CIO^-.

View Text Solution

64. Which colour is obtained when an ammonia solution is added to a solution of copper salt?

View Text Solution

65. Give the name of the compound $CuFeS_2$.

View Text Solution

66. Give the name of element which is synthetic radioactive element having atomic number 116.

View Text Solution

67. Which other substance than oxygen is formed when $KClO_3$, is heated ?

View Text Solution

68. Name the chemicals that pose a threat to ozone layer.

View Text Solution

69. Name a substance which is manufactured by using ozone as an oxidising agent.

View Text Solution

70. Which allotropic form of sulphure is insoluble in water but dissolves readily in CS_2 ?

View Text Solution

71. Which gas is used in refining petroleum and sugar ?

View Text Solution

72. A nation's industrial strength can be judged by the quantity of a chemical produced and consumed by it. What is that?

View Text Solution

73. Name the halogen present in Cryolite.

View Text Solution

74. Name a process used for the manufacture of chlorine by the oxidation of HCI.

View Text Solution

75. What is obtained when three parts of concentrated HCl and one part of concentrated HNO_3 ?

View Text Solution

Short Answer Questions

1. Write the structure of the following

$H_2S_2O_7$

View Text Solution

2. Write the structure of the following

XeO_3

View Text Solution

3. Write the structure of the following

N_2O_5

View Text Solution

4. Write the structure of the following

Br_3

View Text Solution

5. Write the structure of the following molecules :

H_2SO_3

View Text Solution

6. Write the structure of the following molecules :

$XeOF_4$

View Text Solution

7. Complete the following reaction :

$P_4 + H_2O \rightarrow$

View Text Solution

8. Complete the following reaction :

$XeF_4 + O_2F_2 \rightarrow$

View Text Solution

9. What happens when

(i) PCl_5 is heated ? (ii) H_3PO_3 is heated ?

Write the reaction involved.

View Text Solution

10. Explain the following giving an appropriate reason in case :

O_2 and F_2 both stabilise higher oxidation states of metals but O_2 exceeds F_2 in doing so.

View Text Solution

11. Explain the following giving an appropriate reason in case :

Structures of Xenon fluorides cannot be explained by Valence Bond approach.

View Text Solution

12. State reasons for the following:

The N - O bond in NO_2^- is shorter than the N - O bond in NO_3^-.

View Text Solution

13. State reasons for the following:

SF_6 is kinetically an inert substance.

View Text Solution

14. State reasons for each of the following:

All the P-Cl bonds in PCl_5 molecule are not equivalent.

View Text Solution

15. State reasons for each of the following:

Sulphur has greater tendency for catenation than oxygen.

View Text Solution

16. Draw the structure of phosphinic acid (H_3PO_2).

View Text Solution

17. Write a chemical reaction for its use as reducing agent.

View Text Solution

18. Suggest a quantitative method for estimation of the gas which protects us from UV rays of the sun.

View Text Solution

19. Nitrogen oxides emitted from the exhaust system of supersonic jet aeroplanes slowly deplete the concentration of ozone layer in upper atmosphere. Comment.

View Text Solution

20. Complete the following reaction equations :

$XeF_2(s) + H_2O(l) \rightarrow$

View Text Solution

21. Complete the following reaction equations

:

NaOH (cold and dilute) $+Cl_2 \rightarrow$

View Text Solution

22. Draw the structures of white phosphorus and red phosphorus. Which one of these two types of Ophosphorus is more reactive and why?

View Text Solution

23. Complete the following chemical reaction equations :

$$\underset{(\text{conc.})}{I_2} + HNO_3 \rightarrow$$

View Text Solution

24. Complete the following chemical reaction equations :

$$HgCl_2 + PH_3 \rightarrow$$

View Text Solution

25. Draw the structural formulae of the following compounds :

$H_4P_2O_5$

View Text Solution

26. Draw the structural formulae of the following compounds :

XeF_4

View Text Solution

27. What is the covalence of nitrogen in N_2O_5?

View Text Solution

28. Explain why both N and Bi do not form pentahalides while phosphorus does.

View Text Solution

29. When conc. H_2SO_4 was added into an unknown salt present in a test tube, a brown

gas (A) was evolved. This gas intensified when copper turnings were also added into this test tube. On cooling, the gas (A) changed into a colourless gas (B). (a) Identify the gases (A) and (B).

(b) Write the equations for the reactions involved.

View Text Solution

30. Complete the following chemical reaction equations :

$P_4(s) + NaOH(aq) + H_2O(l) \rightarrow$

View Text Solution

31. Complete the following chemical reaction equations :

$I^-(aq) + H_2O(l) + O_3(g) \rightarrow$

View Text Solution

32. Consider the decomposition of hydrogen peroxide in alkaline medium which is catalysed

by iodide ions.

$$2H_2O_2 \xrightarrow{OH^-} 2H_2O + O_2$$

This reaction takes place in two steps as given below :

Step I $H_2O_2 + I^- \rightarrow H_2O + IO^-$ (slow)

Step II $H_2O_2 + IO^- \rightarrow H_2O + I^- + O_2$ (fast)

(a) Write the rate law expression and determine the order of reaction w.r.t. H_2O_2.

(b) What is the molecularity of each individual step ?

View Text Solution

33. Predict the shape of ClF_3 on the basis of VSPER theory.

View Text Solution

34. Give chemical reactions in support of the following observations:

Sulphuric acid has low volatility.

View Text Solution

35. Give chemical reactions in support of the following observations:

Iodide ions can be oxidised by oxygen in acidic medium.

View Text Solution

36. Complete the following chemical reaction equations :

$XeF_2 + H_2O \rightarrow$

View Text Solution

37. Complete the following chemical reaction equations :

$PH_3 + HgCl_2 \rightarrow$

View Text Solution

38. What prompted Bartlett to the discovery of noble gas compounds ?

View Text Solution

39. State two important uses of noble gases.

View Text Solution

40. Assign a reason for each of the following:

(i) Ammonia is a stronger base than phosphine.

(ii) Sulphur in vapour state exhibits a paramagnetic behaviour.

View Text Solution

41. Answer the following questions :

Which neutral molecule would be isoelectronic with ClO^- ?

View Text Solution

42. Answer the following questions :

Of Bi(V) and Sb(V), which may be a stronger oxidising agent and why?

View Text Solution

43. Apply VSEPR theory to deduce the structures of XeF_4 and XeF_6

View Text Solution

44. Write the structures of the following species :

(i) H_3PO_2 (ii) H_2SO_5

View Text Solution

45. How would you account for the following ?

(i) Hydrogen fluoride is much less volatile than hydrogen chloride.

(ii) Interhalogen compounds are strong oxidising agents.

View Text Solution

46. Compare the structural shapes of the following species : SF_4 and SF_6 .

View Text Solution

47. How would you account for the following:

(i) Sulphur hexafluoride is less reactive than sulphur tetrafluoride.

(ii) Of the noble gases only xenon forms known chemical compounds.

View Text Solution

48. Write balanced chemical equations for the following reactions :

$Ca_3P_2 + H_2O \rightarrow$

View Text Solution

49. Write balanced chemical equations for the following reactions :

$XeF_6 + 3H_2O \rightarrow$

View Text Solution

50. Give reasons for the following:

(a) Nitric oxide becomes brown when released

in air.

(b) PCI_5 is ionic in nature in the solid state.

View Text Solution

51. Assign reason for the following:

(a) Noble gases are mostly inert

(b) Bismuth is a strong oxidising agent in pentavalent state.

View Text Solution

52. Write chemical reactions to show that conc. H_2SO_4 can be an oxidising agent.

View Text Solution

53. Write the chemical formula of PCI_5 (s).

View Text Solution

54. Give reasons for the following:

(a) Ammonia acts as a ligand.

(b) Sulphur disappears when boiled with an aqueous solution of sodium sulphite.

View Text Solution

55. Account for the following :

Thermal stability of water is much higher than that of H_2S.

View Text Solution

56. Account for the following :

White phosphorus is more reactive than red phosphorus.

View Text Solution

57. Write the chemical equations involved in the preparation of the following:

(a) XeF_4 (b) H_3PO_3

View Text Solution

58. Give reason for the following :

Sugar gets charred on addition of concentrated sulphuric acid.

View Text Solution

59. Give reason for the following :

All five bonds in PCl_5 molecule are not equivalent.

View Text Solution

60. Give reasons for the following:

HF is least volatile, whereas HCl is the most volatile.

View Text Solution

61. Give reasons for the following:

Concentrated nitric acid turns yellow on exposure to sunlight.

View Text Solution

62. What happens when chlorine is passed through a hot concentrated solution of an alkali like $Ba(OH)_2$?

View Text Solution

63. What happens when XeF_4 undergoes hydrolysis ?

View Text Solution

64. Find the oxidation states of halogens in the following :

(a) Cl_2O (b) $KBrO_3$ (c) $NaClO_4$ (d) ClO_2

View Text Solution

65. How would you account for the following:

Enthalpy of dissociation for F_2 is much less than that for Cl .

View Text Solution

66. How would you account for the following:

Sulphur in vapour state exhibits paramagnetism.

View Text Solution

67. Explain the following observations:

Bismuth oxide is not acidic in any of its reactions.

View Text Solution

68. Explain the following observations:

HF is a weaker acid than HI in aqueous solutions.

View Text Solution

69. Assign a reason for the following statements :

Perchloric acid is a stronger acid than sulphuric acid.

View Text Solution

70. Assign a reason for the following statements :

Of all the noble gases only xenon is known to form established chemical compounds.

View Text Solution

71. Write structural formulae for the following :

(i) IF_5 (ii) $XeOF_2$

View Text Solution

72. Assign a reason for the following statements :

All the bonds in a molecule of PCl_5 are not equal.

View Text Solution

73. Assign a reason for the following statements :

Hydrogen fluoride is a weaker acid than hydrogen chloride in aqueous solution.

View Text Solution

74. Assign a reason for the following:

In Group 15, the bond angle H-M-H decreases in the following order

$NH_3(107.8^\circ), PH_3(93.6^\circ), AsH_3(91.8^\circ)$

View Text Solution

75. Assign a reason for the following:

Sulphur hexafluoride is used as a gaseous electrical insulator.

View Text Solution

76. Complete the following reaction equations

:

$Ca(OCl)_2 + HCl \rightarrow$

View Text Solution

77. Complete the following reaction equations

:

$Ca_3(PO_4)_2 + SiO_2 + C \rightarrow$

View Text Solution

78. Assign a reason for the following statements :

SF_6 is not easily hydrolysed.

View Text Solution

79. Assign a reason for the following statements :

Hydrogen fluoride has a much higher boiling point than hydrogen chloride.

View Text Solution

80. Why is it that nitric oxide is paramagnetic in gaseous state but the solid obtained on cooling it is diamagnetic ?

View Text Solution

81. Out of H_2O and H_2S which has higher bond angle and why?

View Text Solution

82. SF_6 is known but SCI_6 is not. Why?

View Text Solution

83. In the ring test of NO_3^- ion, Fe^{2+} ion reduces nitrate ion to nitric oxide, which combines with Fe^{2+} complex. Write the reactions involved in the formation of brown ring.

View Text Solution

84. Nitric acid forms an oxide of nitrogen on reaction with P_4O_{10} Write the reaction involved. Also write the resonating structures of the oxide of nitrogen formed.

View Text Solution

85. PCl_5 reacts with finely divided silver on heating and a white silver salt is obtained, which dissolves on adding excess aqueous

NH_3 solution. Write the reactions involved to explain what happens.

View Text Solution

86. Assign an appropriate reason for the following:

More metal fluorides are ionic in nature than metal chlorides.

View Text Solution

87. Assign an appropriate reason for the following:

SCI_6 is not known but SF_6 is known.

View Text Solution

Long Answer Question I

1. Give reasons for the following:

Dinitrogen is a gas but phosphorus is a solid.

View Text Solution

2. Give reasons for the following:

Bond angle decreases from H_2O to H_2Te.

View Text Solution

3. Give reasons for the following:

Halogens have the maximum negative electron gain enthalpy.

View Text Solution

4. Give reasons for the following:

NH_3 has a higher boiling point than PH_3.

View Text Solution

5. Give reasons for the following:

H_2Te is more acidic than H_2S.

View Text Solution

6. Give reasons for the following:

Chlorine water on standing loses its yellow

colour.

View Text Solution

7. Give reason for the following :

$(CH_3)_3P=O$ exists but $(CH_3)_3N=O$ does not.

View Text Solution

8. Give reason for the following :

Oxygen has less electron gain enthalpy with

negative sign than sulphur.

View Text Solution

9. Give reason for the following :

H_3PO_2 is a stronger reducing agent than H_3PO_3.

View Text Solution

10. Why is dioxygen a gas but sulphur a solid ?

View Text Solution

11. Give reasons for the following:

Where R is an alkyl group , $R_3P=O$ exists but $R_3N=O$ does not .

View Text Solution

12. Give reasons for the following:

$PbCl_4$ is more covlalent than $PbCl_2$.

View Text Solution

13. Give reasons for the following:

At room temperature , N_2 is much less reactive.

View Text Solution

14. How would you account for the following:

H_2S is more acidic than HP_2O.

View Text Solution

15. How would you account for the following:

The N-O bond in NO_2^- is shorter than the N-O bond in NO_3^-.

View Text Solution

16. How would you account for the following:

Both O_2 and F_2 stabilise high oxidation states but the ability of oxygen to stabilise the higher oxidation state exceeds that of fluorine.

View Text Solution

17. How would you account for the following:

NCI_3 is an endothermic compound while NF_3 is an exothermic one.

View Text Solution

18. How would you account for the following:

XeF_2 is a linear molecule without a bend.

View Text Solution

19. How would you account for the following:

The electron gain enthalpy with negative sign for fluorine is less than that for chlorine, still fluorine is a stronger oxidising agent than chlorine.

View Text Solution

20. Write balanced chemical equations for the following reactions :

Thermal decomposition of ammonium dichromate.

View Text Solution

21. Write balanced chemical equations for the following reactions :

Reaction of Cl_2 with cold and dilute NaOH.

View Text Solution

22. Write balanced chemical equations for the following reactions :

When phosphine is passed through mercuric chloride solution.

View Text Solution

23. Account for the following:

NH_3 is a stronger base than PH_3.

View Text Solution

24. Account for the following:

Sulphur has a greater tendency for catenation than oxygen.

View Text Solution

25. Account for the following:

Bond dissociation energy of F_2 is less than that of Cl_2.

View Text Solution

26. Explain the following situations :

In the structure of HNO_3 molecule, the N - O bond (121 pm) is shorter than N - OH bond (140 pm).

View Text Solution

27. Explain the following situations :

SF_4 is easily hydrolysed whereas SF is not easily hydrolysed.

View Text Solution

28. Explain the following situations :

XeF_2 has a straight linear structure and not a bent angular structure.

View Text Solution

29. Explain the following observations giving appropriate reasons :

Ozone is thermodynamically unstable with respect to oxygen.

View Text Solution

30. Explain the following observations giving appropriate reasons :

The HEH bond angle of the hydrides of Group

15 elements decreases as we move down the group.

View Text Solution

31. Explain the following observations giving appropriate reasons :

Bleaching effect of chlorine is permanent.

View Text Solution

32. Account for the following observations:

among the halogens F_2 is the strongest oxidising agent.

View Text Solution

33. Account for the following observations:

fluorine exhibits only -1 oxidation state whereas other halogens exhibit higher positive oxidation states also.

View Text Solution

34. Account for the following observations:

acidity of oxo acid of chlorine is

$HOCl < HOClO < HOClO_2 < HOClO_3$

View Text Solution

35. Account for the following:

Neon is not known to form compounds.

View Text Solution

36. Account for the following:

Although the electron gain enthalpy of fluorine is less negative than that of chlorine, fluorine is a stronger oxidising agent than chlorine.

View Text Solution

37. Account for the following:

SbF_5 is much more stable than BiF_5 .

View Text Solution

38. Account for the following :

Chlorine water has both oxidising and bleaching properties.

View Text Solution

39. Account for the following :

H_3PO_2 and H_3PO_3 act as good reducing agents while H_3PO_4 does not.

View Text Solution

40. Account for the following :

On addition of ozone gas to KI solution, violet vapours are obtained.

View Text Solution

41. Write down the equations for the hydrolysis of XeF_4 and XeF_6. Which of these two reactions is a redox reaction ?

View Text Solution

42. Write chemical equations for the following processes :

Chlorine reacts with a hot concentrated solution of sodium hydroxide.

View Text Solution

43. Write chemical equations for the following processes :

Orthophosphorus acid is heated.

View Text Solution

44. Write chemical equations for the following processes :

PtF_6 and Xe are mixed together .

View Text Solution

45. Complete the following chemical equations :

$Ca_3P_2(s) + H_2O(l) \rightarrow$

View Text Solution

46. Complete the following chemical equations

:

$Cu^{2+}(aq) + NH_3(aq) \rightarrow$

View Text Solution

47. Complete the following chemical equations

:

$F_2(g) + NH_3(aq) \rightarrow$

View Text Solution

48. On reaction with Cl_2, phosphorus forms two types of halides A and B. Halide A is yellowish white powder but halide B is colourless oily liquid. Identify A and B and write the formulas of their hydrolysis products.

View Text Solution

49. Explain why the stability of oxoacids of chlorine increases in the order given below :

$HClO < HClO_2 < HClO_3 < HClO_4$

View Text Solution

50. P_4O_6 reacts with water according to equation $P_4O_6 + 6H_2O \rightarrow 4H_3PO_3$. Calculate the volume of 0.1 M NaOH solution required to neutralise the acid formed by dissolving 1.1 g of P_4O_6 in H_2O.

View Text Solution

51. White phosphorus reacts with chlorine and the product hydrolysis in the presence of water. Calculate the mass of HCI obtained by the hydrolysis of the product formed by the reaction of 62 g of white phosphorus with chlorine in the presence of water.

View Text Solution

52. Name three oxoacids of nitrogen. Write the disproportionation reaction of that oxoacid of

nitrogen in which nitrogen is in +3 oxidation state.

View Text Solution

53. Give an example to show the effect of concentration of nitric acid on the formation of oxidation product.

View Text Solution

54. Give reasons for the following:

Addition of Cl_2 to KI solution gives it a brown colour, but excess of Cl_2 turns it colourless.

View Text Solution

55. Give reasons for the following:

Phosphinic acid behaves as a monoprotic acid.

View Text Solution

56. Give reasons for the following:

White phosphorus is much more reactive than red phosphorus.

View Text Solution

Long Answer Question Ii

1. Account for the following:

(i) Acidic character increases from HF to HI.

(ii) There is large difference between the

melting and boiling points of oxygen and sulphur.

(iii) Nitrogen does not form pentahalides

View Text Solution

2. Draw the structures of the following:

(i) ClF_3 (ii) XeF_4

View Text Solution

3. Which allotrope of phosphorus is more reactive and why?

View Text Solution

4. How the supersonic jet aeroplanes are responsible for the depletion of ozone layer?

View Text Solution

5. F_2 has lower bond dissociation enthalpy than Cl_2. Why?

View Text Solution

6. Which noble gas is used in filling balloons for meteorological observations ?

View Text Solution

7. Complete the equation :

$XeF_2 + PF_5 \rightarrow$

View Text Solution

8. Account for the following:

Helium is used in diving apparatus.

View Text Solution

9. Account for the following:

Fluorine does not exhibit positive oxidation state.

View Text Solution

10. Account for the following:

Oxygen shows catenation behaviour less than sulphur.

View Text Solution

11. Draw the structures of the following molecules :

(i) XeF_2 (ii) $H_2S_2O_8$

View Text Solution

12. Complete the following chemical equations :

$Cu + HNO_3$ (dilute) $\rightarrow$

View Text Solution

13. Complete the following chemical equations

:

$XeF_4 + O_2F_2 \rightarrow$

View Text Solution

14. Explain the following observations:

Phosphorus has greater tendency for catenation than nitrogen.

View Text Solution

15. Explain the following observations:

Oxygen is a gas but sulphur is a solid.

View Text Solution

16. Explain the following observations:

The halogens are coloured. Why?

View Text Solution

17. Explain the following:

NF_3 is an exothermic compound whereas NCl_3 is not.

View Text Solution

18. Explain the following:

F_2 is most reactive of all the four common halogens.

View Text Solution

19. Complete the following chemical equations

:

$C + H_2SO_4(conc.) \rightarrow$

View Text Solution

20. Complete the following chemical equations

:

$P_4 + NaOH + H_2O \rightarrow$

View Text Solution

21. Complete the following chemical equations

:

$$Cl_2 + F_2 \underset{(\text{excess})}{F_2} \rightarrow$$

View Text Solution

22. Account for the following:

The acidic strength decreases in the order

$HCl > H_2S > PH_3$

View Text Solution

23. Account for the following:

Tendency to form pentahalides decreases down the group in Group 15 of the periodic table.

View Text Solution

24. Complete the following chemical equations :

$P_4 + SO_2Cl_2 \rightarrow$

View Text Solution

25. Complete the following chemical equations

:

$XeF_2 + H_2O \rightarrow$

View Text Solution

26. Complete the following chemical equations

:

$I_2 + \underset{(\text{conc.})}{HNO_3} \rightarrow$

View Text Solution

27. Draw the structure of the following molecules:

(a) $(HPO_3)_3$ (b) BrF_3

View Text Solution

28. Complete the following chemical equations :

$HgCl_2 + PH_3 \rightarrow$

View Text Solution

29. Complete the following chemical equations

:

$SO_3 + H_2SO_4 \rightarrow$

View Text Solution

30. Complete the following chemical equations

:

$XeF_4 + H_2O \rightarrow$

View Text Solution

31. What happens, when chlorine gas is passed through a hot concentrated solution of NaOH ?

View Text Solution

32. What happens, when sulphur dioxide gas is passed through an aqueous solution of a Fe(III) salt

View Text Solution

33. Answer the following :

What is the basicity of H_2SO_4 and why?

View Text Solution

34. Answer the following :

Why does fluorine not play the role of a central atom in interhalogen compounds ?

View Text Solution

35. Answer the following :

Why do noble gases have very low boiling points ?

View Text Solution

36. Complete the following chemical equations :

$NaOH(aq) + Cl_2(g) \rightarrow$
(Hot and conc.)

View Text Solution

37. Complete the following chemical equations

:

$XeF_6(s) + H_2O(l) \rightarrow$

View Text Solution

38. How would you account for the following ?

The value of electron gain enthalpy with negative sign for sulphur is higher than that for oxygen.

View Text Solution

39. How would you account for the following ?

NF_3 is an exothermic compound but NCI, is endothermic compound.

View Text Solution

40. How would you account for the following ?

ClF_3 molecule has a T-shaped structure and not a trigonal planar one.

View Text Solution

41. Complete the following chemical reaction equations :

$P_4 + SO_2Cl_2 \rightarrow$

View Text Solution

42. Complete the following chemical reaction equations :

$XeF_4 + H_2O \rightarrow$

View Text Solution

43. Explain the following observations giving appropriate reasons :

The stability of +5 oxidation state decreases down the group in Group 15 of the periodic table.

View Text Solution

44. Explain the following observations giving appropriate reasons :

Solid phosphorus pentachloride behaves as an ionic compound.

View Text Solution

45. Explain the following observations giving appropriate reasons :

Halogens are strong oxidising agents.

View Text Solution

46. X_2 is a greenish yellow gas with an offensive smell used in water purification. It partially dissolves in water to give a solution which turns blue litmus red. When X_2 is

passed through NaBr solution, Br_2 is obtained.

Identify X_2.

View Text Solution

47. X_2 is a greenish yellow gas with an offensive smell used in water purification. It partially dissolves in water to give a solution which turns blue litmus red. When X_2 is passed through NaBr solution, Br_2 is

obtained.

Name the group to which it belongs.

View Text Solution

48. X_2 is a greenish yellow gas with an offensive smell used in water purification. It partially dissolves in water to give a solution which turns blue litmus red. When X_2 is passed through NaBr solution, Br_2 is obtained.

Write general electronic configuration of this group.

View Text Solution

49. X_2 is a greenish yellow gas with an offensive smell used in water purification. It partially dissolves in water to give a solution which turns blue litmus red. When X_2 is passed through NaBr solution, Br_2 is obtained.

What are the products obtained when X_2 reacts with H_2O ? Write chemical equations.

View Text Solution

50. X_2 is a greenish yellow gas with an offensive smell used in water purification. It partially dissolves in water to give a solution which turns blue litmus red. When X_2 is passed through NaBr solution, Br_2 is obtained.

What happens when X_2 reacts with hot and conc. NaOH ? Give equations.

View Text Solution

51. An orange solid A on heating gives a colourless gas B. The gas B in dry condition is passed over heated Ca to give a solid C. The solid C further reacts with water to produce gas D, which forms a blue coloured compound Eon reaction with copper sulphate solution.

Identify A, B, C, D, E and give the sequence of reactions involved.

View Text Solution

52. Arrange the following in order of property indicated for each set:

(i) HCl, HI, HBr, HF - Decreasing thermal stability.

(ii) Xe, He, Kr, Rn, Ne -Decreasing order of electron gain enthalpy.

View Text Solution

53. Give reasons :

Solid PCl_5 is an ionic compound.

View Text Solution

54. Give reason :

Most of the reactions of fluorine are exothermic .

View Text Solution

55. Give reasons :

Ozone is thermodynamically unstable.

View Text Solution

56. Draw the structures of the following :

(i) $XeOF_4$ (ii) $H_4P_2O_7$

View Text Solution

57. Complete the following chemical equations

:

$F_2(g) + H_2O(l) \rightarrow$

View Text Solution

58. Complete the following chemical equations

:

$O_3(g) + I^-(aq) + H_2O(l) \rightarrow$

View Text Solution

59. Complete the following chemical equations

:

$Ca_3P_2(s) + H_2O(l) \rightarrow$

View Text Solution

60. Draw the structural formulae of the following molecules :

(i) XeF_4 (ii) $H_2S_2O_7$

View Text Solution

61. Assign reason for the following:

Sulphur vapour is paramagnetic.

View Text Solution

62. Assign reason for the following:

Ammonia (NH_3) has greater affinity for protons than phosphine (PH_3).

View Text Solution

63. Assign reason for the following:

The negative value of electron gain enthalpy of fluorine is less than that of chlorine.

View Text Solution

64. Assign reason for the following:

SF_6 is much less reactive than SF_4.

View Text Solution

65. Assign reason for the following:

of the noble gas, only xenon is known to form well-established chemical compounds.

View Text Solution

66. An amorphous solid "A" burns in air to form a gas "B" which turns lime water milky. The gas is also produced as a by-product during roasting of sulphide ore. This gas decolourises acidified aqueous $KMnO_4$ solution and reduces Fe^{3+} to Fe^{2+}. Identify the solid "A" and the gas "B" and write the reactions involved.

View Text Solution

67. On heating lead (II) nitrate gives a brown gas "A". The gas "A" on cooling changes to colourless solid "B". Solid "B" on heating with no changes to a blue solid 'C'. Identify 'A', 'B' and 'C' and also write reactions involved and draw the structures of 'B' and 'C'.

View Text Solution

68. On heating compound (A) gives a gas (B) which is a constituent of air. This gas when

treated with 3 mol of hydrogen (H_2) in the presence of a catalyst gives another gas (C) which is basic in nature. Gas C on further oxidation in moist condition gives a compound (D) which is a part of acid rain. Identify compounds (A) to (D) and also give necessary equations of all the steps involved.

View Text Solution

Self Assessment Test Section A

1. Which of the following is not a p-block element ?

A. Barium

B. Nitrogen

C. Selenium

D. Tellurium

Answer: A

View Text Solution

2. Choose the correct option:

A. Nitrogen comprises 78% by volume of atmosphere.

B. It occurs in the earth's crust also.

C. It is found as protein in plants and animals.

D. All the above.

Answer: D

View Text Solution

3. Oxygen shows anomalous behaviour because

A. it supports combustion.

B. it is found in the atmosphere.

C. because of its large size.

D. because of its small size.

Answer: D

View Text Solution

4. Hydrogen peroxide on heating gives

A. hydrogen and oxygen.

B. water and oxygen.

C. H_4O_2

D. HO

Answer: B

View Text Solution

5. Which of the following is not a neutral oxide ?

A. CO

B. NO

C. SO_2

D. N_2O

Answer: C

View Text Solution

6. Assertion (A) : Rhombic sulphur is obtained by evaporating a solution of roll sulphur is CS_2

Reason (R) : Fluorine forms two oxides, OF_2 and O_2F_2.

A. Both Assertion (A) and Reason (R) are correct statements, and Renson (R) is the correct explanation of the Assertion (A)

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not

the correct explanation of the Assertion (A)

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement

Answer: B

View Text Solution

7. Assertion (A): Noble gases show no tendency for chemical reaction.

Reason (R) : Noble gas have complete octet in their outermost shell.

A. Both Assertion (A) and Reason (R) are correct statements, and Renson (R) is the correct explanation of the Assertion (A)

B. Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not

the correct explanation of the Assertion (A)

C. Assertion (A) is correct, but Reason (R) is incorrect statement.

D. Assertion (A) is incorrect, but Reason (R) is correct statement

Answer: A

View Text Solution