The p block elements (Group 15-18)

1. How many P– P bonds present in cyclotrimetaphosphoric acid $(HPO_3)_3$?
2. What happens when conc. H_2SO_4, is slowly added to cane sugar?
3. In interhalogen compounds of the type AB_5 and AB_7, B is invariably fluorine. Why?
4. Why are the elements of Group 18 known as noble gases?
5. How many oxidation states are shown by nitrogen?
6. H_2S is less acidic than H_2Te. Give reason.
7. What is the composition of bleaching powder?
8. How will you prepare xenon oxytetrafluoride?
9. What happens when (give balanced chemical equation only):
(a) ammonia is treated with sodium hypochlorite.
(b) phosphine burns in chlorine.
10. Give four uses of bleaching powder.
11. ClF_3 exists but FCl_3 does not. Why?
12. Draw the structures of the following molecules:
(i) SF_4, (ii) XeF_4
13. PCl_5 exists as $[PCl_6]^-$ $[PCl_4]^-$ but PBr_5 exists as $[PBr_4]^-$ $[Br]^-$. Explain.
14. Why are oxygen-fluorine binary compounds called Oxygen fluoride? Give the preparation of chlorine dioxide, ClO_2.
15. Why halogens are strong oxidising agents?
16. Give an equation in which the xenon fluoride act as a
(i) fluoride donor, (i) fluoride acceptor.
17. Why does a nitric acid bottle appear yellow?
18. Compare : Maximum covalency of oxygen and sulphur.
OR
Compare: Structures of pentoxides of nitrogen and phosphorus.
19. Why $(CH_3)_3N$ is pyramidal, whereas $(SiH_3)_3N$ is planar?
20. Why halogens are coloured?
21. Give reasons for the following:
(i) Noble gases are mostly inert.
(ii) Noble gases form compounds with fluorine
and oxygen only.
(iii) Neon is generally used for warning signals.
22. Account for the following:
(i) NH, has higher boiling point than PH_3.
(i) H_3PO_3 is diprotic acid.
23. Give reason : Oxygen molecule has the formula O_2 while sulphur has S_2.
24. Give reasons :
(i) Xenon does not form fluorides such as XeF_3 and XeF_5.
(ii) Out of noble gases, only xenon is known to form established chemical compounds.
(ii) Noble gases have very low boiling points.
25. Knowing the electron gain enthalpy values of $O \rightarrow O^-$ and $O \rightarrow O^{2-}$ as -141 and 702 kJ mol^{-1} respectively, how can you account for the formation of a large number of oxides having O^{2-} species and not O^-?
26. Arrange the following in order of property indicated for each set:
(i) F_2, Cl_2, Br_2, I_2 - increasing bond dissociation enthalpy.
(ii) $HClO_4$, $HClO_3$, $HClO_2$, HClO – increasing acid strength.
27. NO is paramagnetic in the gaseous state but diamagnetic in the solid and liquid states. Justify.
OR
Why is nitrous acid oxidant as well as reductant?

28. Assign appropriate reasons for each of the following statements:
(a) Metal fluorides are more ionic in nature than metal chlorides.
(b) Hydrogen fluoride is a weaker acid than hydrogen chloride in aqueous solution.
(c) Addition of CI_2 to KI solution gives it a brown colour but excess of Cl_2, turns it colourless.
(d) Perchloric acid is a stronger acid than sulphuric acid.
OR
(a) Why does fluorine provide the largest variety of interhalogen compounds among the halogens?
(b) Bond dissociation enthalpy of F_2 is less than that of Cl_2. Explain.
(c) KHF_2 is a well-known compound whereas $KHCI_2$ does not exist.
29. (a) Which of the following does not exist and why?
(i) $XeOF_4$ (i) NeF_2 (ii) XeF_4 (iv) XeF_6
(b) How are XeO_3 and $XeOF_4$ prepared?
(c) How is ozone estimated quantitatively?
OR
(a) Does the hydrolysis of XeF_6 lead to a redox reaction?
(b) How are XeF_2, XeF_4, and XeF_6, obtained?
30. Give reasons for the following:
(a) H_2S acts only as reducing agent while SO_2 can act both as a reducing agent and an oxidizing agent.
(b) PF_5 is known but NF_5 is not known.
(c) Hydrogen sulphide cannot be dried by passing through conc. H_2SO_4.
OR
(a) Among the hydrides of group 16, water shows unusual physical properties.
Give reason.
(b) H_2O is a liquid while H,S is a gas at room temperature. Why?
(c) Write the conditions to maximize the yield of H_2SO_4 by contact process.