CHEMISTRY

BOOKS - VIKRAM PUBLICATION (ANDHRA PUBLICATION)

THE P-BLOCK ELEMENTS GROUP-13

Solved Problems

1. Standard electrode potential values, E^{θ} for Al^{3+}/Al is - 1.66 V and that of Tl^{3+}/Tl is +

1.26 V. Predict about the formation of M^{3+} ion in solution and compare the electropositive.character of the two metals.

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2. White fumes appear around the bottle of anhydrous aluminium chloride. What is the reason ?

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3. Boron is unable to form BF_6^{3-} ion because of

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4. Why is boric acid considered as a weak acid?

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Important Questions

1. Why does BF_3 behave as a Lewis acid ?

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2. What happens when boric acid is heated ?

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3. Explain why atomic radius of Ga is less than that of Al.

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4. Explain inert pair effect.

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5. Write balanced equations for

$BF_3 + LiH \rightarrow$

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6. Write balanced equations for

$$B_2H_6 + H_2O \rightarrow$$

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7. Write balanced equations for

$$NaH + B_2H_6$$

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8. Write balanced equations for

$$H_3BO_3 \xrightarrow{\Delta}$$

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9. Write balanced equations for

$$B_2H_6 + NH_3 \xrightarrow{\Delta}$$

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10. What is the hybridization of B in diborane and borazine ?

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11. Give the formula of borazine . What is its common name ?

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12. What happens when Li AlH_4 and BCl_3 mixture in dry ether is warmed

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13. What happens when Borax is heated with H_2SO_4 ?

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14. Sketch the structure of Orthoboric acid .

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15. What are electron deficient compounds ? Is BCl_3 an electron deficient species ? Explain.

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16. B-Cl bond has a bond moment. Explain why BCl_3 molecule has zero dipole moment.

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17. Explain the structure of boric acid.

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18. What happens when Borax is heated strongly ?

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19. What happens when Boric acid is added to water ?

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20. What happens when Aluminium is heated with dilute NaOH ?

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21. What happens when BF_3 is treated with ammonia ?

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22. What happens when Hydrated alumina is treated with aq.NaOH solution ?

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23. Give reasons

Conc. HNO_3 can be transported in aluminium container.

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24. Give reasons

A mixture of dil. NaOH and aluminium pieces in used to open drain.

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25. Give reasons

Aluminium alloys are used to make aircraft body

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26. Give reasons

Aluminium utensils should not be kept in water overnight.

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27. Give reasons

Aluminium wire is used to make transmission cables .

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28. Explain borax bead test with a suitable example

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29. Explain the structure of diborane.

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30. Explain the reactions of aluminium with acids.

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31. Give two methods of preparation of diborane.

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32. How does diborane react with H_2O ?

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33. How does diborane react with CO ?

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34. How does diborane react with $N(CH_3)_3$?

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35. $Na_2B_4O_7$ + Conc. $H_2SO_4 \rightarrow A \xrightarrow[\text{(ii) Ignite}]{(i)\, C_2H_5OH} B$ (Green edged flame)

Identify A and B .

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36. How are borax and boric acid prepared ? Explain the action of heat on them.

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37. How is diborane prepared ? Explain its structure .

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38. Write any two methods of preparation of diborane. How does it react with carbon monoixde .

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39. Write any two methods of preparation of diborane. How does it react with Ammonia .

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Very Short Answer Questions

1. Discuss the pattern of variation in the oxidation states of Boron of Thallium .

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2. How do you explain higher stability of Tl Cl_3 ?

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3. Why does BF_3 behave as a Lewis acid ?

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4. Is boric acid a protic acid ? Explain

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5. What happens when boric acid is heated ?

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6. Describe the shapes of BF_3 and BH_4^-. Assign the hybridization of boron in these species.

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7. Explain why atomic radius of Ga is less than that of Al.

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8. Explain inert pair effect.

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9. Write balanced equations for

$BF_3 + LiH \rightarrow$

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10. Write balanced equations for

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11. Write balanced equations for

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12. Write balanced equations for

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13. Write balanced equations for

$$B_2H_6 + NH_3 \xrightarrow{\Delta}$$

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14. Why is boric acid polymeric ?

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15. What is the hybridization of B in diborane and borazine ?

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16. Write the electronic configuration of group-13 elements .

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17. Give the formula of borazine . What is its common name ?

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18. Give the formulae of Borax .

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19. Give the formulae of Colemanite.

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20. Give two uses of aluminium .

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21. What happens when Li AlH_4 and BCl_3 mixture in dry ether is warmed

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22. What happens when Borax is heated with H_2SO_4 ?

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23. Sketch the structure of Orthoboric acid .

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24. Write the structure of $AlCl_3$ as a dimer.

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25. Metal borides (having $.^{10}B$) are used as protective shield - why ?

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Short Answer Questions

1. Write reactions to justify amphoteric nature of aluminium .

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2. What are electron deficient compounds ? Is BCl_3 an electron deficient species ? Explain.

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3. Suggest reasons why the B-F bonds lengths in BF_3 (130 pm) and BF_4^- (143 pm) differ.

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4. B-Cl bond has a bond moment. Explain why BCl_3 molecule has zero dipole moment.

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5. Explain the structure of boric acid.

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6. What happens when Borax is heated strongly ?

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15. Give reasons

Aluminium wire is used to make transmission cables .

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16. Explain why the electronegativity of Ga, In and Tl will not vary very much.

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17. Explain borax bead test with a suitable example

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18. Explain the structure of diborane.

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19. Explain the reactions of aluminium with acids.

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20. Write a short note on the anomalous behaviour of boron in the group - 13.

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21. Aluminium reacts with dil. HNO_3 but not with conc. HNO_3-explain.

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22. Give two methods of preparation of diborane.

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23. How does diborane react with H_2O ?

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24. How does diborane react with CO ?

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25. How does diborane react with $N(CH_3)_3$?

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26. Al_2O_3 is amphoteric -explain with suitable reactions.

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27. $Na_2B_4O_7$ + Conc. $H_2SO_4 \rightarrow A \xrightarrow[\text{(ii) Ignite}]{(i)\, C_2H_5OH} B$ (Green edged flame)

Identify A and B .

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Long Answer Questions

1. How are borax and boric acid prepared ? Explain the action of heat on them.

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2. How is diborane prepared ? Explain its structure .

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3. Write any two methods of preparation of diborane. How does it react with (i)Carbon monoxide and (ii)Ammonia ?

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