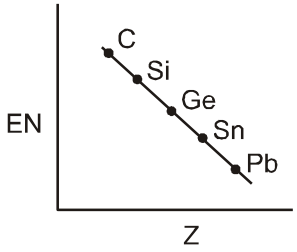
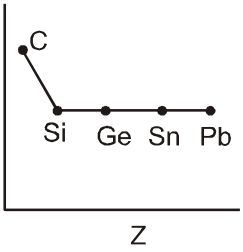
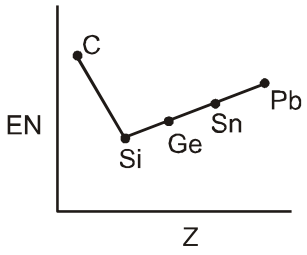
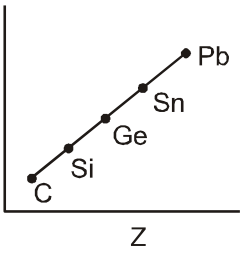
Self Practice Paper (SPP)

1. Which of the following is the correct graph for EN values of carbon family :

(1) 

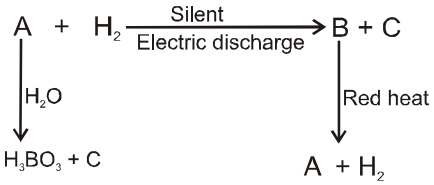
(2) 

(3) 

(4) 

2. Select the incorrect statement :
(1) Silicon does not form an allotrope like graphite because of its no tendency of multiple bond formation.
(2) Catenation tendency is greater in C than in Si.
(3) CO is stable in nature but SiO does not
(4) None of these

3. Which of the following statement about Si is correct.
(1) Si predominantly forms covalent componds with oxidation number as +4.
(2) Ionisation enthalpy of Si is more than that of carbon.
(3) Electron affinity of Si is less than that of carbon.
(4) Si can't show coordination number more than 4.

4. 

Identify correct statement.
(1) C is a weak lewis acid
(2) B is a weak lewis base
(3) C is a strong acid
(4) D reacts with NaOH to produce C

5. $4BCl_3 + 3LiAlH_4 \longrightarrow A + 3AlCl_3 + 3\,LiCl$
When A reacts with NaOH it produces a colourless combustible gas and another compound 'B'. Select incorrect statement about 'B'.
(1) It aqueous solution turns red litmus blue
(2) It shows anionic hydrolysis
(3) It shows cationic hydrolysis
(4) It can also produce by reaction of boron with NaOH

6. When heating white lead then find out released gas (A) and (B)
$2PbCO_3.Pb(OH)_2 \xrightarrow{\Delta} Pb_3O_4 + (A) + (B) + H_2O$
(white lead)
(1) CO, O_2 (2) CO_2 , O_2 (3) CO_2, CH_4 (4) CO, CO_2

7. Amorphous boron is extracted from borax by following step

Borax $\xrightarrow{(A)}$ H_3BO_3 $\xrightarrow{Heat}$ B_2O_3 $\xrightarrow{(B)}$ Boron

Then (A) and (B) are :

(1) H_2SO_4, Al (2) HCl, carbon (3) H_2SO_4, Mg (4) HCl, Fe

8. The role of addition of Me_3SiCl during the hydrolysis followed by conduction of Me_2SiCl_2 is.

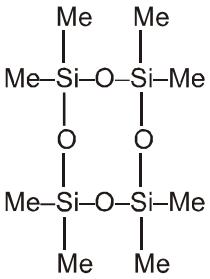
(1) To catalyte the reaction.

(2) To terminate the chain and hence controlling the molecular weight.

(3) For obtaiming a proper cross linking.

(4) All of the above

9. Given type of silicones are called [P]



[P] is prepared by controlled hydrolysis of [Q]

[P] & [Q] are respectively.

(1) Linear silicone, CH_3SiCl_3 (2) branched silicone, $(CH_3)_3SiCl$

(3) Cyclic silicone, $(CH_3)_2SiCl_2$ (4) Cyclic silicone, CH_3SiCl_3

10. Which of the following is not a property of silicones ?

(1) They are combustible

(2) They are water - repellant

(3) They are polymeric liquids or solids

(4) Their viscosity does not change significaltly with rise in tamperature.

11. Which allotropic form of carbon is thermodynamically most stable ?

(1) Diamond (2) Graphite (3) Fullerene (4) Charcoal

12. Which of the following products is obtained when silicon is heated with methyl chloride at high temperature in the presence of copper ?

(1) $[Cu(CH_3)_4]$ (2) $CuCl_2$ (3) $(CH_3)_2SiCl_2$ (4) $SiCl_4$

13. The dehydration of malonic acid $CH_2(COOH)_2$ with P_4O_{10} gives :

(1) carbon monoxide (2) carbon suboxide (3) carbon dioxide (4) all three

14. Borax on heating with cobalt oxide forms a blue bead of :

(1) $Co(BO_2)_2$ (2) $CoBO_2$ (3) $Co_3(BO_3)_2$ (4) $Na_3Co(BO_3)_2$

15. The dissolution of $Al(OH)_3$ by a solution of NaOH results in the formation of :

(1) $[Al(H_2O)_4(OH)]^{2+}$ (2) $[Al(H_2O)_2(OH)_4]^-$ (3) $[Al(H_2O)_3(OH)_3]$ (4) $[Al(H_2O)_6(OH)_3]$

16. Select the incorrect statement about the boron.

(1) Pure form of the elements are obtained by the reduction of BCl_3 with zinc at 900ºC.

(2) Crystalline boron is attacked only by hot concentrated oxidising agents.

(3) Amorphous boron and ammonia at white heat gives $(BN)_x$, a slippery white solid with a layer structure resembling that of graphite.

(4) Boron does form B^{3+} cation easily.

17. Aqueous solution containing 1 mol of borax reacts with 2 mol of acids. This is because of :
(1) formation of 2 mol of $B(OH)_3$ only
(2) formation of 2 mol of $[B(OH)_4]^-$ only
(3) formation of 1 mol each of $B(OH)_3$ and $[B(OH)_4]^-$
(4) formation of 2 mol each of $[B(OH)_4]^-$ and $B(OH)_3$, of which only $[B(OH)_4]^-$ reacts with acid

18. Match List (Fuels) with List II (composition) and select the correct answer using the codes given below the lists:

List I (Fuels)	**List II (Composition)**
(1) Water gas	i. A mixture of CO and N_2
(2) Producer gas	ii. Methane
(3) Coal gas	iii. A mixture of CO and H_2
(4) Natural gas	iv. A mixture of CO, H_2, CH_4 and CO_2

	(1)	(2)	(3)	(4)		(1)	(2)	(3)	(4)
(1)	iii	i	iv	ii	(2)	iii	i	ii	iv
(3)	i	iii	iv	ii	(4)	iii	ii	iv	i

19. Water transported through lead pipes becomes poisonous due to the formation of:
(1) PbO (2) PbO_2 (3) $Pb(OH)_2$ (4) Pb_3O_4

20. When steam is passed over red hot coke, the outgoing gas contains –
(1) Producer gas (2) Water gas (3) Coal gas (4) None of the above

21. In BF_3, the B-F bond length is 1.30 Å, when BF_3 is allowed to be treated with Me_3N, it forms an adduct, $Me_3N \rightarrow BF_3$, The bond length of B-F in the adduct is:
(1) Greater than 1.30Å (2) Smaller than 1.30 Å
(3) Equal to 1.30 Å (4) None of these

22. Aluminium is extracted by the electrolysis of :
(1) alumina (4) bauxite
(3) molten cryolite. (4) alumina mixed with molten cryolite

23. A compound of boron X reacts at 200ºC temperature with NH_3 to give another compound Y which is called as inorganic benzene. The compound Y is a colourless liquid and is highly light sensitive. Its melting point is –57ºC. The compound X with excess of NH_3 and at a still higher temperature gives boron nitride $(BN)_n$. The compounds X and Y are respectively :
(1) BH_3 and B_2H_6 (2) $NaBH_4$ and C_6H_6 (3) B_2H_6 and $B_3N_3H_6$ (4) B_4C_3 and C_6H_6

24. When tin is treated with concentrated nitric acid
(1) It is converted into stannous nitrate (2) It is converted into stannic nitrate
(3) It is converted into metastannic acid (4) It becomes passive

25. Silicon dioxide is formed by the reaction of
(1) $SiCl_4 + 2H_2O$ (2) $SiO_2 + 4HF$ (3) $SiO_2 + NaOH$ (4) $SiCl_4 + NaOH$

26. Dry ice is :
(1) Solid NH_3 (2) Solid SO_2 (3) Solid CO_2 (4) Solid N_2

27. When Al is added to KOH solution
(1) No action takes place (2) Oxygen is evolved
(3) Water is produced (4) Hydrogen is evolved

28. Which of the following reactions lead to chemical inertness :
(1) Lead with dilute H_2SO_4 (2) Lead with conc. HCl
(3) Aluminium with oxygen (4) All of above reactions

29. Which of the following statements regarding ortho boric acid (H_3BO_3) is false ?
(1) It acts as a weak monobasic acid (2) It is soluble in hot water
(3) It has a planar structure (4) It acts as a tribasic acid

30. Which of the following is a correct match :

I : Potash alum – $K_2SO_4.Al_2(SO_4)_3.24H_2O$

II : Chrome alum – $K_2SO_4.Cr_2(SO_4)_3.24H_2O$

III : Potash alum $K_2SO_4.Fe_2(SO_4)_3.24H_2O$

IV : Ammonium alum – $(NH_4)_2SO_4.Al_2(SO_4)_3.24H_2O$

(1) I, II, II & IV (2) I, II & III (3) I, II & IV (4) Only II & IV

31. Which of the following is incorrect?
(1) The +3 oxidation state stability order is $B^{3+} > Al^{3+} > Ga^{3+} > In^{3+} > Tl^{3+}$
(2) The +1 oxidation state stability order is $Ga^{+} > In^{+} > Tl^{3+}$
(3) Boron has isohedral shape with 20 faces.
(4) The +2 oxidation state stability order is $Ge^{2+} < Sn^{2+} < Pb^{2+}$

32. Which of the following statement is incorrect.
(1) Hardest substance found on earth is an allotrope of Carbon.
(2) Tin do not have allotropes.
(3) Thermodynamically most stable allotrope of carbon have, all the carbons as sp^2 hybridsed.
(4) Most abundant found element among plants from G-14 elements is carbon.

33. Boron is not obtained by :
(1) Thermal decomposition of diborane
(2) Reduction of boron chloride by hydrogen
(3) Reduction of boric anhydride by magnesium metal
(4) Heating boric acid

34. Synthetic diamond can be prepared from graphite at
(1) very low temperature and high pressure
(2) high temperature (around 1600°C & 50,000 atms)
(3) diamond cannot be prepared from graphite
(4) high temperature and low pressure

35. For given processes, choose the correct order of purity of silicon obtained.
I. $SiO_2 + 2C \longrightarrow Si + 2CO$
II. $Si(pure) + 2Cl_2 \longrightarrow SiCl_4$
$SiCl_4 + 2Mg \longrightarrow Si + MgCl_2$
III. $Na_2[SiF_6] + 4Na \longrightarrow 6NaF + Si \longrightarrow$Zone refined Si
(1) I > II > III (2) III > II > I (3) I = II = III (4) II > I > III

36. For reaction of boron with element 'X_n', boron forms B_2X_3. 'X_n' can be
(a) O_2 (b) S (c) N_2 (d) Cl_2
(1) only a (2) b & c (3) a, b & d (4) a & b

37. Choose least probable reaction
(1) $C(graphite) + O_2(g) \longrightarrow CO_2(g)$ (2) $C(graphite) + ½\ O_2(g) \longrightarrow CO(g)$
(3) $Si + O_2(g) \longrightarrow SiO_2$ (4) $Si + ½O_2(g) \longrightarrow SiO$

38. E represents an element belonging to boron family.

$2E + 3X_2 \longrightarrow 2EX_3$

(X = F, Cl, Br, I)

(1) Oxidation state of E in all EX_3 is +3

(2) All EX_3 are predominantly ionic

(3) Tl does not form TlX_3 as Tl^{+1} is more stable than Tl^{+3}

(4) There exists some EX_3 for which E shows +1 oxidation state.

39. E represents an element belonging to carbon family.

$E + 2X_2 \longrightarrow EX_4$

(X = F, Cl, Br, I)

(1) Stability of EX_4 decreases down the 14th group

(2) PbI_4 does not exist

(3) Ge & Pb forms EX_2 as well.

(4) All are correct

40. Conc. HNO_3

(1) Reacts with aluminium vigorously (2) Reacts with aluminium to form aluminium nitrate

(3) Does not react with aluminium (4) Reacts with platinum

41. The hardest substance amongst the following is :

(1) B_4C (2) graphite (3) titanium (4) SiC

42. Which of the following reaction yields boron nitride.

(1) $B_2H_6 + NH_3(\text{excess}) \xrightarrow[\text{temperature}]{1000}$ (2) $B_2H_6 + NH_3(\text{excess}) \xrightarrow[\text{high temperature}]{(>200^\circ C)}$

(3) $B_2H_6 + 2NH_3 \xrightarrow{\text{high temperature}}$ (4) $B_2F_6 + 2N(CH_3)_3 \longrightarrow$

43. Which hydride among the following has different structure than others :

(1) Diborane (B_2H_6) (2) Dimer of alane (Al_2H_6)

(3) Digallane (Ga_2H_6) (4) Silane (SiH_4)

44. Production of Silane from trichlorosilane involves boiling of $HSiCl_3$, products obtained are :

(1) Only SiH_4 (2) SiH_4 and $SiCl_4$ (3) SiH_4, H_2 and $SiCl_4$ (4) H_2 and SiH_4

45. In Zeolite :

(1) Ti^{IV} substitute some Si^{IV} in 3D–network of SiO_2.

(2) Aluminium atoms substitute some Si^{IV} in 3D-network of SiO_2.

(3) Na^+ or Ca^{2+} replaces some Si^{IV} in 3D-network of SiO_2.

(4) Aluminium replaces oxygen in 3D-network of SiO_2.

SPP Answers

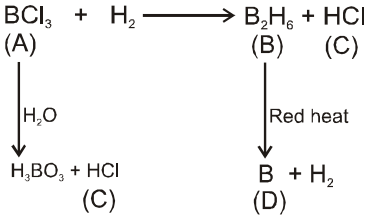
1.	(2)	**2.**	(4)	**3.**	(1)	**4.**	(3)	**5.**	(3)	**6.**	(4)	**7.**	(3)
8.	(2)	**9.**	(3)	**10.**	(1)	**11.**	(2)	**12.**	(3)	**13.**	(2)	**14.**	(1)
15.	(2)	**16.**	(4)	**17.**	(4)	**18.**	(1)	**19.**	(3)	**20.**	(2)	**21.**	(1)
22.	(4)	**23.**	(3)	**24.**	(3)	**25.**	(1)	**26.**	(3)	**27.**	(4)	**28.**	(4)
29.	(4)	**30.**	(3)	**31.**	(2)	**32.**	(2)	**33.**	(4)	**34.**	(2)	**35.**	(2)
36.	(4)	**37.**	(4)	**38.**	(4)	**39.**	(4)	**40.**	(3)	**41.**	(1)	**42.**	(2)
43.	(4)	**44.**	(2)	**45.**	(2)								

SPP Solutions

1. The EN values of Carbon family are :

Element	C	Si	Ge	Sn	Pb
EN	2.5	1.8	1.8	1.8	1.9

4.



5. A is B_2H_6

$B_2H_6 + 6\ NaOH \longrightarrow 2\ Na_3BO_3 + 6\ H_2$

B is Na_3BO_3 a salt of SBWA.

6. $2PbCO_3.Pb(OH)_2 \xrightarrow{\Delta} Pb_3O_4 + CO + CO_2 + H_2O$

7. $Na_2B_4O_7 + H_2SO_4 + 5H_2O \longrightarrow Na_2SO_4 + 4H_3BO_3$

$2H_3BO_3 \longrightarrow B_2O_3 + 3H_2O$

$B_2O_3 + 3Mg \longrightarrow 2B + 3MgO$

8. Being contaning one hallogen atom it is ultilized for terminating the chain.

9. $4(CH_3)_2 + 8H_2O \rightarrow [P] + 8HCl + 4H_2O$

10. It is a fact.

11. $\Delta H_f^{\ominus}$ of graphite is taken as zero.

12. $2CH_3Cl + Si \xrightarrow[570\ K]{Cu\ powder} (CH_3)_2SiCl_2$

14. $CoO + B_2O_3 \longrightarrow Co(BO_2)_2$ (blue bead)

15. As $Al(OH)_3$ is amphoteric in nature and thus form $[Al(H_2O)_2(OH)_4]^-$.

16. Due to small size of boron, the sum of its first three ionization enthalpies is very high. This prevents it to form +3 ions.

17. $[B_4O_5(OH)_4]^{2-} + 5H_2O \rightleftharpoons 2B(OH)_3$ (weak acid) $+ 2[B(OH_4)]^-$ (salt)

22. Alumina is mixed with cryolite, in molten state which make alumina good conductor and lowers the fusion temperature also.

23. The reactions involved are

$3B_2H_6 + 6NH_3 \longrightarrow \underset{(X)}{2B_3N_3H_6} + \underset{(Y)}{12H_2}$; $B_2H_6 + NH_3$ (excess) $\xrightarrow{\text{at higher temperature}} (BN)_n + H_2$

Y is borazole which is isosteric with benzene.

28. (1) $Pb + H_2SO_4 \longrightarrow PbSO_4$ (layer) $+ H_2 \uparrow$

(2) $Pb +$ Conc. $HCl \longrightarrow PbCl_2$(Coating) $+ H_2 \uparrow$

(3) $2Al + 3/2\ O_2 \longrightarrow Al_2O_3(s)$

29. $B(OH)_3 + 2HOH \rightleftharpoons [B(OH)_4]^- + H_3O^+$.

In aqueous solution the boron completes its octet by accepting OH^- from water molecules. It therefore function as a weak monobasic lewis acid.

31. The +1 oxidation state stability order is $B^+ < Al^+ < Ga^+ < In^+ < Tl^+$.

32. (2) is incorrect. Tin can exist as white Tin and Grey tin.

(1) Correct, Diamond.

(3) Graphite thermodynamically more stable than diamond.

(4) Plants have high carbon content among G-14 elements.

33. $B_2H_6 \xrightarrow[\Delta]{} 2B + 2H_2 \uparrow$

$BCl_3 + H_2 \xrightarrow[\Delta]{} B + HCl \uparrow$

$B_2O_3 + Mg \xrightarrow[\Delta]{} B + MgO$

$H_3BO_3 \xrightarrow[\Delta]{} B_2O_3 + H_2O$

36. (1) $4B + 3O_2 \xrightarrow{\Delta} 2B_2O_3$ (2) $2B + 3S \xrightarrow{1200^\circ C} B_2S_3$

(3) $2B + N_2 \xrightarrow{\Delta} 2BN$ (4) $2B + 3Cl_2 \xrightarrow{\Delta} 2BCl_3$

41. Boron carbide is harder than silicon carbide.