1. Aluminium is not used
(a) In silvery paints
(b) For making utensils
(c) As a reducing agent
(d) As oxidizer in metallurgy

2. In the thermite process the reducing agent is
(a) Al (b) C
(c) Mg (d) Na

3. In Goldschmidt aluminothermic process, thermite contains
(a) 3 parts of Al_2O_3 and 4 parts of Al
(b) 3 parts of Fe_2O_3 and 2 parts of Al
(c) 3 parts of Fe_2O_3 and 1 part of Al
(d) 1 part of Fe_2O_3 and 1 part of Al

4. Bauxite containing impurities of iron oxide is purified by
(a) Hoop's process (b) Serpeck's process
(c) Baeyer's process (d) Electrolytic process

5. In the purification of bauxite by Hall's process
(a) Bauxite ore is heated with $NaOH$ solution at 50^oC
(b) Bauxite ore is fused with Na_2CO_3
(c) Bauxite ore is fused with coke and heated at 1800^oC in a current of nitrogen
(d) Bauxite ore is heated with $NaHCO_3$

6. Which one is used as a bye-product in Serpeck's process
(a) NH_3 (b) CO_2
(c) N_2 (d) PH_3

7. In the metallurgy of aluminium, cryolite is mixed in the molten state because it
(a) Increases the melting point of alumina
(b) Oxidises alumina
(c) Reduces alumina
(d) Decreases the melting point of alumina

8. In the electrolytic extraction of aluminium, cryolite is used
(a) To obtain more aluminium
(b) To decrease temperature to dissolve bauxite
(c) To protect the anode
(d) As reducing agent

9. In the extraction of aluminium, bauxite is dissolved in cryolite because
(a) It acts as a solvent
(b) It reduces melting point of aluminium oxide
(c) It increases the resistance of aluminium oxide
(d) Bauxite becomes active

10. In the extraction of aluminium the electrolyte is
(a) Fused cryolite with felspar
(b) Fused cryolite with fluorspar
(c) Pure alumina in molten cryolite
(d) Pure alumina with bauxite and molten cryolite

11. Aluminium is obtained by
(a) Reducing Al_2O_3 with coke
(b) Electrolysing Al_2O_3 dissolved in Na_3AlF_6
(c) Reducing Al_2O_3 with chromium
(d) Heating alumina and cryolite

12. In the electrolysis of alumina, cryolite is added to
(a) Increase the melting point of alumina
(b) Increase the electrical conductivity
(c) Minimise the anodic effect
(d) Remove impurities from alumina

13. The function of fluorspar in the electrolytic reduction of alumina dissolved in fused cryolite (Na_3AlF_6) is
(a) As a catalyst
(b) To lower the temperature of the melt and to make the fused mixture very conducting
(c) To decrease the rate of oxidation of carbon at the anode
(d) None of the above

14. For purification of alumina, the modern processes most useful when (i) the impurity present is a lot of iron oxides and (ii) the impurity present is a lot of silica, are
(a) For (i) Hall's process; for (ii) Baeyer's process
(b) For (i) Hall's process; for (ii) Serpeck's process
(c) For (i) Serpeck's process; for (ii) Baeyer's process
(d) For (i) Baeyer's process; for (ii) Serpeck's process

15. For the electrolytic production of aluminium, (i) the cathode and (ii) the anode are made of
(a) (i) Platinum and (ii) Iron
(b) (i) Copper and (ii) Iron
(c) (i) Copper and (ii) Carbon
(d) (i) Carbon and (ii) Carbon

16. In the commercial electrochemical process for aluminium extraction, the electrolyte used is
(a) $Al(OH)_3$ in $NaOH$ solution
(b) An aqueous solution of $Al_2(SO_4)_3$
(c) A molten mixture of Al_2O_3 and Na_3AlF_6
(d) A molten mixture of $AlO(OH)$ and $Al(OH)_3$

17. In electrolysis of aluminium oxide which of the following is added to accelerate the process
(a) Silica (b) Cryolite
(c) Nickel (d) Silicate

18. The purification of alumina is called
(a) Bosch process (b) Caster process
(c) Baeyer's process (d) Hoop's process

19. Electrolytic reduction of alumina to aluminium by Hall-Heroult process is carried out in the presence of
(a) *NaCl*
(b) Fluorite
(c) Cryolite which forms a melt with lower melting temperature
(d) Cryolite which forms a melt with higher melting temperature

20. In the electrolytic method of obtaining aluminium from purified bauxite, cryolite is added to the charge in order to
(a) Minimize the heat loss due to radiation
(b) Protect aluminium produced from oxygen
(c) Dissolve bauxite and render it conductor of electricity
(d) Lower the melting point of bauxite

21. Hoop's process is used for the purification of the metal
(a) *Al* (b) *Zn*
(c) *Ag* (d) *Cu*

22. Purification of aluminium done by electrolytic refining is known as
(a) Serpeck's process (b) Hall's process
(c) Baeyer's process (d) Hoop's process

23. In the Hoope's process for refining of aluminium, the fused materials form three different layers and they remain separated during electrolysis also. This is because
(a) The upper layer is kept attracted by the cathode and the lower layer is kept attracted by the anode
(b) There is special arrangement in the cell to keep the layers separate
(c) The 3 layers have different densities
(d) The 3 layers are maintained at different temperatures

24. During metallurgy of aluminium bauxite is dissolved in cryolite because
(a) Bauxite is non-electrolyte
(b) Cryolite is a flux
(c) Cryolite acts as an electrolyte
(d) All are correct

25. For the electrolytic refining of aluminium, the three fused layers consist of

	Bottom Layer	**Middle Layer**	**Upper Layer**
(a)	Cathode of pure *Al*	Cryolite and fluorspar	Anode of *Al* and *Cu* alloy
(b)	Cathode of *Al* and *Cu* alloy	Bauxite and cryolite	Anode of pure *Al*
(c)	Anode of *Al* and *Cu* alloy	Cryolite and barium fluoride	Cathode of pure *Al*

(d)

Anode of impure *Al*	Bauxite, cryolite and fluorspar	Cathode of pure *Al*

26. Heating an aqueous solution of aluminium chloride to dryness will give

(a) $AlCl_3$ (b) Al_2Cl_6

(c) Al_2O_3 (d) $Al(OH)Cl_2$

27. The structure of diborane (B_2H_6) contains

(a) Four 2c-2e bonds and two 3c-2e bonds

(b) Two 2c-2e bonds and four 3c-2e bonds

(c) Two 2c-2e bonds and two 3c-3e bonds

(d) Four 2c-2e bonds and four 3c-2e bonds

28. Which of the following is the electron deficient molecule

(a) B_2H_6 (b) C_2H_6

(c) PH_3 (d) SiH_4

29. In Hall's process, the main reagent is mixed with

(a) NaF (b) Na_3AlF_6

(c) AlF_3 (d) None of these

30. Acedic strength of Boron trihalide are in order of

(a) $BF_3 < BCl_3 < BBr_3 < BI_3$

(b) $BI_3 < BBr_3 < BCl_3 < BF_3$

(c) $BBr_3 < BCl_3 < BF_3 < BI_3$

(d) $BF_3 < BI_3 < BCl_3 < BBr_3$

1. (d) Aluminium is used as reducing agent in metallurgy.

2. (a) *Al* is used as reducing agent in thermite process.

3. (c) In Goldschmidt aluminothermic process, thermite contains 3 parts of Fe_2O_3 and 1 part of Al .

4. (c) For the purification of red bauxite which contains iron oxide as impurity $\rightarrow$ Baeyer's process. For the purification of white bauxite which contains silica as the main impurity Serpeck's process.

5. (b) In Hall's process

$$Al_2O_3.2H_2O + Na_2CO_3 \rightarrow 2NaAlO_2 + CO_2 + 2H_2O \quad 2NaAlO_2 + 3H_2O + CO_2 \xrightarrow{333\ K} 2Al(OH)_3 \downarrow + Na_2CO_3$$

$$2Al(OH)_3 \xrightarrow{1473\ K} Al_2O_3 + 3H_2O$$

6. (a)

7. (d) Cryolite Na_3AlF_6

(1) Decreases the melting point of alumina

(2) Increases conductivity of the solution

8. (b) Cryolite Na_3AlF_6 is added

(1) To decrease the melting temp from $2323\ K$ to $1140\ K$

(2) To increase the electrical conductivity of solution

9. (b)

10. (c)

11. (b)

12. (b)

13. (b)

14. (d) Iron oxide impurity – Baeyer's process

Silica impurity – Serpeck's process

15. (d)

16. (c)

17. (b) Cryolite is added to lower the melting point of alumina and to increase the electrical conductivity.

18. (c) The purification of alumina can be done by Baeyer's process.

19. (c)

20. (c) In electrolytic method of obtaining aluminium from purified bauxite, cryolite is added to charge because it reduces the melting point of Bauxite (from $1200\ ^oC$ to $800^o - 900\ ^oC$) and also it increases electrical conductivity of mixture.

21. (a) Hoop's process $\Rightarrow$ Purification of *Al*

Hall and Heroult process $\Rightarrow$ Reduction of Al_2O_3

Baeyer's and Serpeck's process $\Rightarrow$ Concentration of Bauxite ore

22. (d)

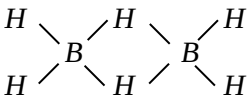
23. (c)

24. (c)

25. (c)

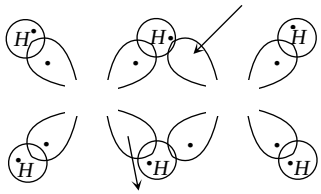
26. (c)

27. (a)



$3c-2e$: $B-H-B$; $2c-2e$: $H-B-H$

28. (a) B_2H_6



29. (b) Pure alumina is a bad conductor of electricity and the fusion temperature of pure alumina is about 2000°C and at this temperature when the electrolysis is carried of fused mass the metal formed vapoureses as the boiling point of Al is 1800°C.

To overcome this difficulty, Na_3AlF_6 and CaF_2 are mixed with alumina.

30. (a) Concentration of Lewis acid of boron tri halides is increased in following order. $BF_3 < BCl_3 < BBr_3 < BI_3$.