7.17. Complete the following reactions:
(i) $C_2H_2 + O_2 \rightarrow$
(ii) $4Al + 3\ O_2 \rightarrow$
Ans:

$$\text{(i) } C_2H_4 + 3O_2 \xrightarrow{\text{Heat}} 2CO_2 + 2H_2O$$

$$\text{(ii) } 4Al + 3O_2 \xrightarrow{\text{Heat}} 2Al_2O_3$$

7.18. Why does O_3 act as a powerful oxidising agent?
Ans: On heating, O_3 readily decomposes to give O_2 and nascent oxygen.

$$O_3 \xrightarrow{\text{Heat}} O_2 + O(\text{nascent oxygen})$$

Since nascent oxygen is very reactive, therefore, O_3 acts as a powerful oxidising agent.

7.19. How is O_3 estimated quantitatively?
Ans: When O_3 is treated with excess of KI solution buffered with borate buffer (pH = 9.2), I2 is liberated quantitatively.

$$2I^-(aq) + H_2O(l) + O_3(g) \longrightarrow 2OH^-(aq) + I_2(s) + O_2(g)$$

The I_2 thus liberated is titrated against a standard solution of sodium thiosulphate using starch as an indicator.

$$2Na_2S_2O_3 + I_2 \longrightarrow Na_2S_4O_6 + 2NaI$$

7.20. What happens when sulp'hur dioxide is passed through an aqueous solution of Fe(III) salt?
Ans: SO_2 acts as a reducing agent and reduces aqueous solution of Fe (III)salt to Fe (II) salt.

$$SO_2 + 2H_2O \longrightarrow SO_4^{2-} + 4H^+ + 2e^-$$

$$2Fe^{3+} + 2e^- \longrightarrow 2Fe^{2+}$$

$$2Fe^{3+} + SO_2 + 2H_2O \longrightarrow 2Fe^{2+} + SO_4^{2-} + 4H^+$$

7.21. Comment on the nature of two S-O bonds formed in S02 molecule. Are the two S-O bonds in this molecule equal ?
Ans: SO_2 exists as an angular molecule with OSO bond angle of 119.5°. It a resonance hybrid of two canonical-forms:

Due to resonance, the two π-bonds are equal.

7.22. How is the presence of SO_2 detected ?

Ans. SO_2 is a pungent smelling gas. It can be detected by two test:

(i) SO_2 turns pink colour of $KMnO_4$ to colourless due to reduction of MnO_4^- to Mn^{2+}

$$\underset{\text{(Pink)}}{2MnO_4^-} + 5SO_2 + 2H_2O \longrightarrow \underset{\text{(colourless)}}{2Mn^{2+}} + 5SO_4^{2-} + 4H^+$$

(ii) It turns orange colour of acidified $K_2Cr_2O_7$ to green due to reduction of $Cr_2O_7^{2-}$ to Cr^{3+}

$$\underset{\text{(orange)}}{Cr_2O_7^{2-}} + 3SO_2 + 2H^+ \longrightarrow \underset{\text{(green)}}{2Cr^{3+}} + 3SO_4^{2-} + H_2O$$

********** END **********