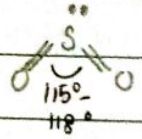
NO:

DATE 10.09.18

SULFUR & ITS OXIDE

→ SO_2



→ bent shape

→ reducing agent (gains O) $SO_2 + H_2O \longrightarrow H_2SO_3$

→ food preservative

→ **Acid Rain**

→ H_2SO_3 weak , H_2SO_4 strong

↳ $[H^+]$ very ↑ ∵ 2 dissociation steps

1st ionisation / dissociation

① $H_2SO_4(l) + aq \rightarrow H^+_{(aq)} + HSO_4^-(aq)$

2nd

② $HSO_4^-(aq) \rightleftharpoons H^+(aq) + SO_4^{2-}(aq)$

* HSO_4^- behaves as weak acid

∵ H^+ from 1st step suppresses.

→ H_2SO_3
$H_2CO_3 \rightleftharpoons CO_2 + H_2O$ } weak

HNO_3
H_2SO_4 } strong.

→ Effects of acid rain (H_2SO_4)

↳ erosion of rocks & stone buildings

→ $CO_3^{2-} \rightarrow SO_4^{2-}$ that are H_2O soluble

→ material becomes weakened as soluble sulfate leached away.

↳ river & lake pH ↓ → X aquatic life

↳ de-forestation → leaches essential plant nutrients out of soil.

→ **Contact Process.**

→ raw materials : sulfur, air, water

→ ① $S + O_2 \longrightarrow SO_2$ * only ½ of the O_2 used ∵ (passed over S very fast)

↳ O_2 needed for 2nd stage

$\Delta H = -197 kJ/mol$ ↳ Prevent all O_2 from being used up.

② $2SO_2 + O_2 \rightleftharpoons 2SO_3$ * Conditions : → 2 atm (just to push gass through vessel)

at compromise temp, yield = 97%. ∴ no need for ~~very ↑ pressure~~. ← → 450 °C

→ V_2O_5 vanadium (V) oxide

③ $SO_3 + H_2SO_4 \longrightarrow H_2S_2O_7$ (oleum) * if direct = exothermic

$H_2S_2O_7 + H_2O \longrightarrow H_2SO_4$ = acid mist

→ Excess SO_2 must be removed by scrubbers (solid base)

→ Uses of H_2SO_4 → fertilisers → dyes / paints → car batteries

→ detergents → tanning leather