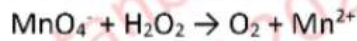


6) A 15.0 mL aqueous sample containing hydrogen peroxide was analyzed by titration with permanganate in acidic pH such that the following reaction took place:



Knowing that the sample required 97.8 mL of 0.0234 M permanganate to reach the end point, what is the concentration of hydrogen peroxide in the original sample?

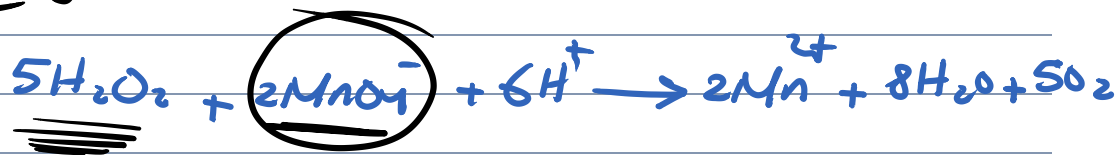
### Balancing in acidic medium.

① writing oxidation and reduction reactions

② Balancing

- any element except for O, H
- balance O by adding  $\text{H}_2\text{O}$
- " H " "  $\text{H}^+$
- "  $e^-$

③ Combining



$$\begin{aligned}
 & \left. \begin{array}{l} V = 97.8 \text{ mL} \\ C = 0.0234 \end{array} \right\} n = C \times V \\
 & = 0.0234 \times \frac{97.8}{1000} \\
 & = \underline{\underline{0.002288 \text{ mol}}}
 \end{aligned}$$

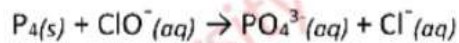
$$n_{\text{H}_2\text{O}_2} = 0.00572$$

$\text{H}_2\text{O}_2$   
5  
?

$\text{MnO}_4^-$   
2  
0.002288

$$C = \frac{n}{V} = \frac{0.00572}{0.015} = \underline{\underline{0.381 \text{ M}}}$$

7) Given the following reaction:



- a) balance the equation for redox reaction in acidic solution by showing oxidation states, indicating reduced and oxidized species, showing half-reactions and necessary steps.
- b) Suppose that the reaction occurs in basic solution, based on your answer in part a, show the balanced equation of the redox reaction in one step.

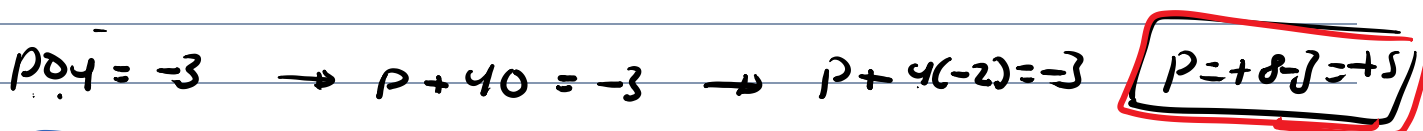
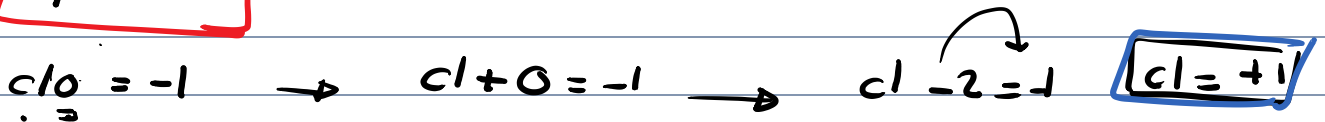
Oxidation → increase in Oxidation no.

Reduction → decrease in oxidation no.

Oxidation States (O.N.)

- Free element: zero (e.g.,  $P_4, Cl_2, Na, Fe$ )
- Whole compound:
  - Group 1: +1 (e.g.,  $Li, Na, K, Rb, Cs$ )
  - Group 2: +2 (e.g.,  $Be, Sr, Mg, Ca, Ra, Ba$ )
  - Al: +3
  - Zn: +2
  - Ag: +1
  - O: -2
  - H: +1
- Charge:
  - $+1 = Na^+$
  - $-3 = P^{3-}$
  - $-2 = SO_4^{2-}$
  - $O_2 = +2$
  - $H_2O = -1$
  - metal hydride: -1

\*  $P_4 = 0$

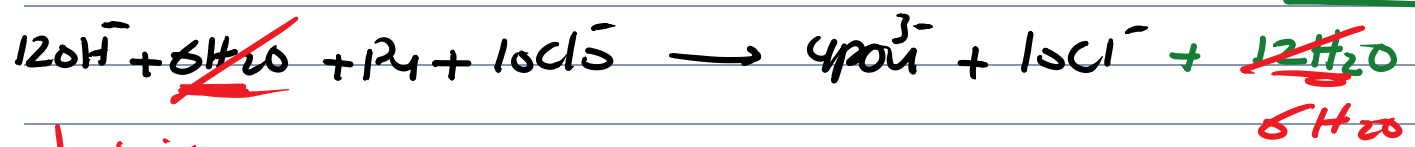
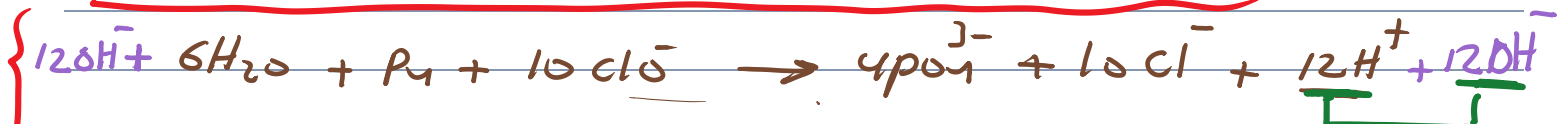
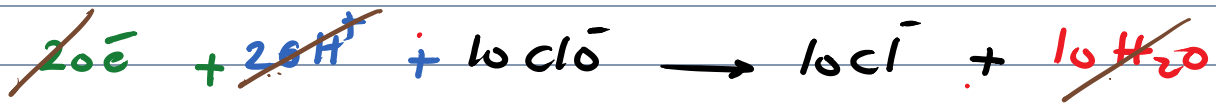
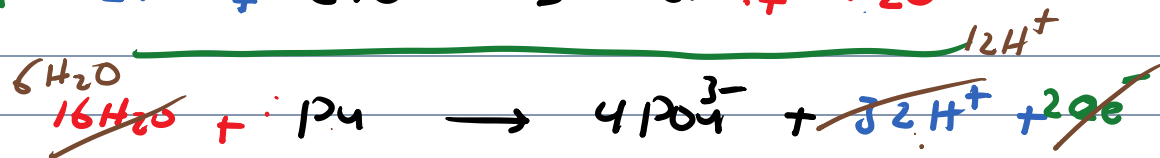
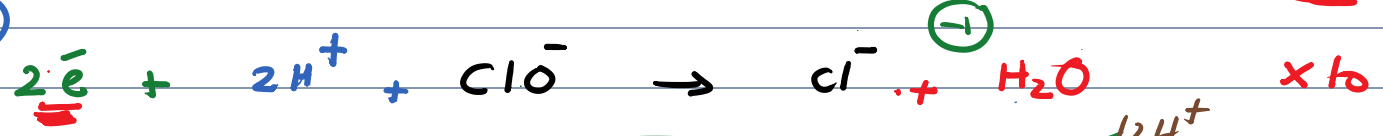
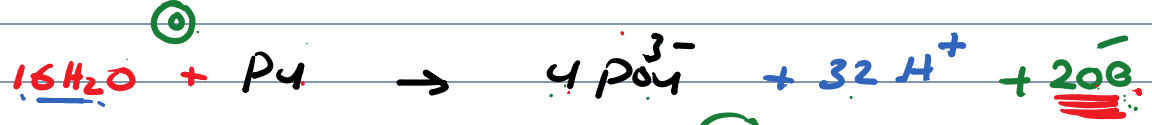


\*  $Cl = -1$

lose e<sup>-</sup> (P)



gaining e<sup>-</sup> (P)



basic





