

Problem 1

(a) $+1$

(b) $+1$

(c) -1

(d) $+1$

(e) $x + 4(-1) = -2 \Rightarrow +2$

(f) $+3$

(g) $+6$

(h) $+2$

Problem 2

It is ~~tot~~ oxidized and reduced.

Problem 3

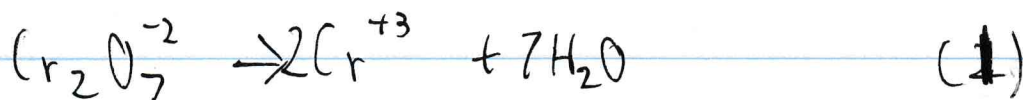
(a) Write half reactions:



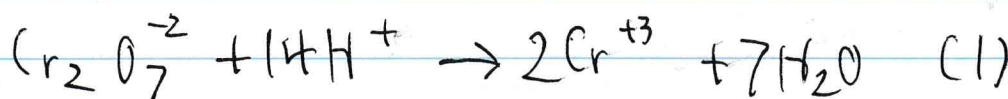
• Balance (1)



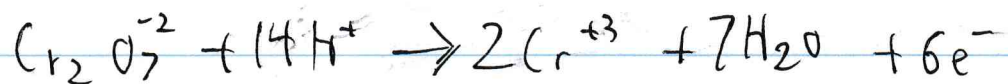
• Add water:



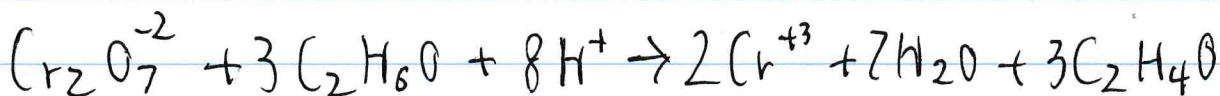
• Add hydrogen:



• Add electrons and multiply:

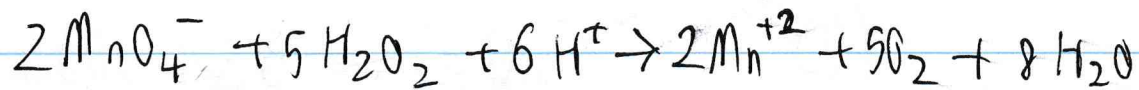


Multiply and add



$\text{Cr}_2\text{O}_7^{-2}$ is the oxidizing agent, $\text{C}_2\text{H}_6\text{O}$ is the reducing agent.

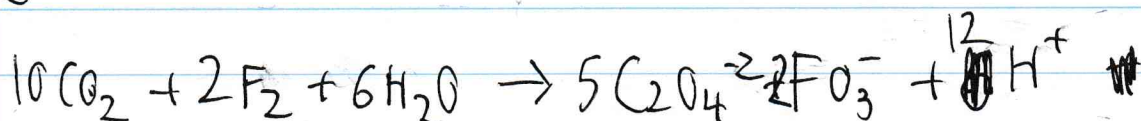
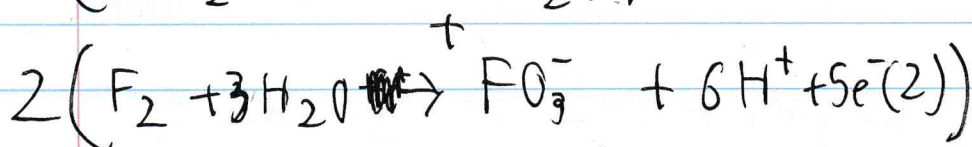
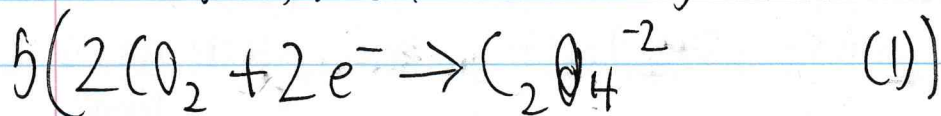
(b): Follow the exact same series of steps as (a) to get



MnO_4^- is the oxidizing agent, H_2O_2 is the reducing agent

Problem 4

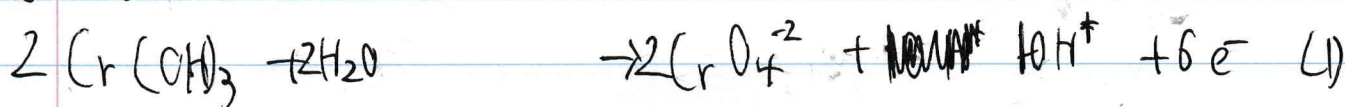
(a) We are going to solve as if acidic, then add OH^- to each side:



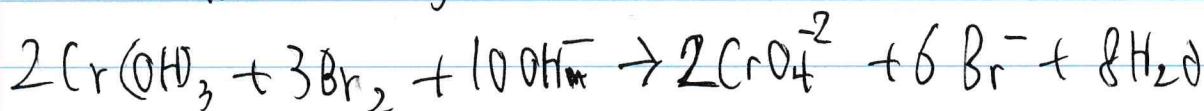
adding 12 OH^- to each side,



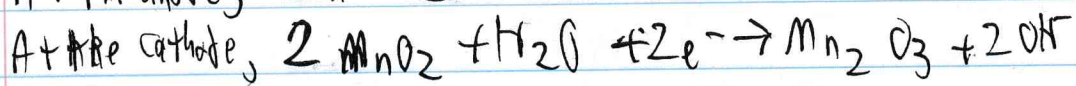
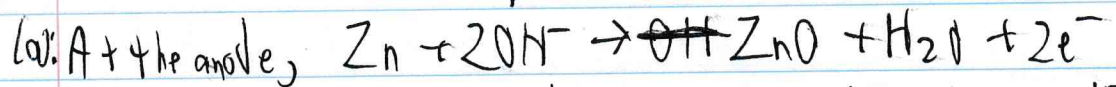
(b) Get the ~~expression~~^{half-} equations for acidic:



Sum and add OH^- to get



Problem 5



Overall,



Problem 6

$$30\text{ A} \cdot 3600\text{ seconds} \cdot \frac{1\text{ mol}}{96485\text{ C}} = 1.12\text{ moles } e^-$$

$$\text{Molar mass } W = 183.84\text{ g/mol} \Rightarrow 2+$$