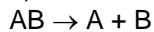
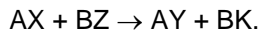


PROCEDURA PER REAZIONE REDOX

1) scrivo la reazione come presentata ( cioè non completa e non bilanciata)



.....



.....

2) verifico quale è l'ossidante e il riducente ( sapendo che ossidante + e<sup>-</sup> → riducente) dai numeri di ossidazione  
ossidante A (valenza + alta) + elettroni → A (valenza + bassa)

.....

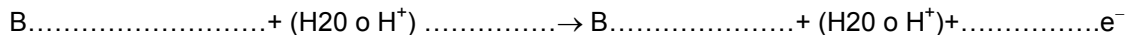
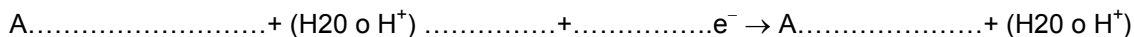
riducente B (valenza bassa o negativa) → B (valenza + alta)

.....

( ricordo che riduzione O → O<sup>-</sup> e ossidazione = O<sup>-</sup> → O)

O (ossidante) + e + H<sup>+</sup> ⇌ O<sup>-</sup> (riducente) + H<sub>2</sub>O )

3) scrivo le semireazioni dell'ossidante e riducente (ai reagenti aggiungo H<sup>+</sup> oppure H<sub>2</sub>O e elettroni



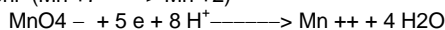
4) bilancio il n° di elettroni aggiunti e tolti; semplifico e sommo

5) controllo sempre il bilancio delle masse molari e delle cariche

esercizi preliminari

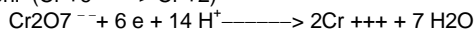
• scrivi la semireazione di riduzione del KMnO<sub>4</sub> / che è un ossidante)

ridurre significa acquistare elettroni (Mn +7 → Mn +2)



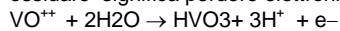
• scrivi la semireazione di riduzione del K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> / che è un ossidante)

ridurre significa acquistare elettroni (Cr +6 → Cr +2)



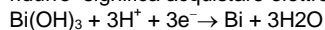
• scrivi la semireazione di VO<sup>+</sup> +(riducente) → HVO<sub>3</sub>)

ossidare significa perdere elettroni (V +1 → V +5)



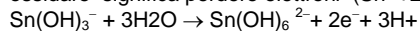
• scrivi la semireazione di Bi(OH)<sub>3</sub> (ossidante) → Bi)

ridurre significa acquistare elettroni (Bi +3 → Bi 0)



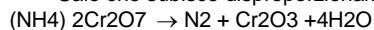
• scrivi la semireazione di Sn(OH)<sub>3</sub><sup>-</sup> ( riducente) → Sn(OH)<sub>6</sub><sup>-</sup>)

ossidare significa perdere elettroni (Sn +2 → V +4)

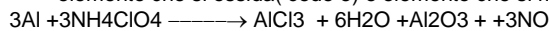


Tipi di reazione redox

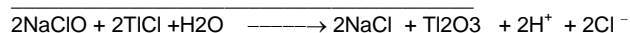
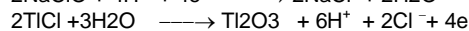
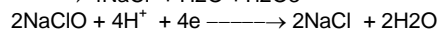
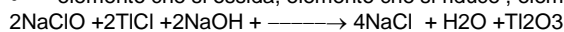
• Sale che subisce disproporzionamento ( un solo elemento si ossida e riduce)



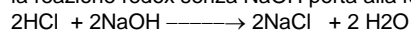
• elemento che si ossida( cede e) e elemento che si riduce (acquista e)



• elemento che si ossida, elemento che si riduce , elemento che partecipa reagendo con i prodotti e ne forma altri



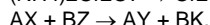
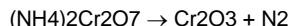
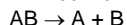
la reazione redox senza NaOH porta alla formazione di HCl che reagisce con NaOH



- falsa redox ( la reazione non comporta variazione di valenza ma solo precipitazione  
( è sbagliato scrivere  $\text{Cr}_2\text{O}_7^{2-} + 2 \text{e}^- \longrightarrow 2\text{CrO}_4^{2-}$  perché non è una ossidoriduzione e Cr è sempre a valenza 6)  
 $\text{Cr}_2\text{O}_7^{2-} + 2\text{Ba}^{++} + 2 \text{CH}_3\text{COO}^- + \text{H}_2\text{O} \longrightarrow 2\text{BaCrO}_4 \downarrow + 2 \text{CH}_3\text{COOH}$

**PROCEDURA PER REAZIONE REDOX** ( data 19.021996)

- scrivo la reazione come presentata ( cioè non completa e non bilanciata)

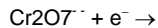


no.....

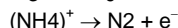
- verifico quale è l'ossidante e il riducente dai n° di ossidazione

( sapendo che ossidante + e<sup>-</sup> → riducente)

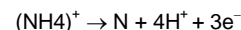
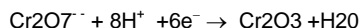
ossidante A (valenza + alta) + elettroni → A (valenza + bassa)



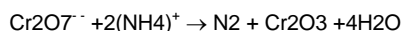
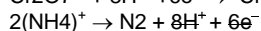
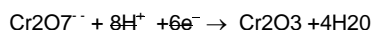
riducente B (valenza bassa o negativa) → B (valenza + alta)



- scrivo le semireazioni dell'ossidante e riducente (ai reagenti aggiungo H<sup>+</sup> oppure H<sub>2</sub>O e elettroni in modo che le cariche si bilancino)



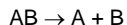
- bilancio il n° di elettroni aggiunti e tolti; semplifico e sommo



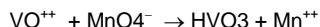
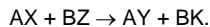
Sistema veloce ( poco sicuro ) : osservo la reazione e spesso mancano H<sup>+</sup> o H<sub>2</sub>O ; in questo caso H appariva a sinistra e non a destra , dunque era presumibile che a destra mancasse H<sub>2</sub>O

**PROCEDURA PER REAZIONE REDOX**( data 19.021996)

- scrivo la reazione come presentata ( cioè non completa e non bilanciata)

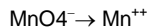


.....no.....

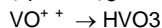


- verifico quale è l'ossidante e il riducente ( sapendo che ossidante + e<sup>-</sup> → riducente) dai numeri di ossidazione

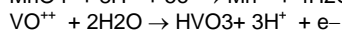
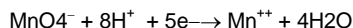
ossidante A (valenza + alta) + elettroni → A (valenza + bassa)



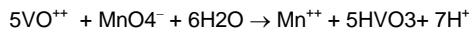
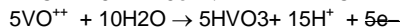
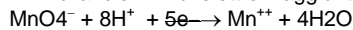
riducente B (valenza bassa o negativa) → B (valenza + alta) + elettroni



- scrivo le semireazioni dell'ossidante e riducente (ai reagenti aggiungo H<sup>+</sup> oppure H<sub>2</sub>O e elettroni



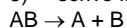
- bilancio il n° di elettroni aggiunti e tolti; semplifico e sommo



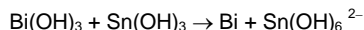
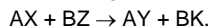
Sistema veloce ( poco sicuro ) : osservo la reazione e spesso mancano H<sup>+</sup> o H<sub>2</sub>O ; in questo caso H appariva a destra , dunque era presumibile che a sinistra si dovesse aggiungere H<sub>2</sub>O o H<sup>+</sup> ; non è facilmente intuibile se andasse aggiunto H<sub>2</sub>O o H<sup>+</sup> ( dalle due semireazioni si capisce che sono stati aggiunti entrambi ).

**PROCEDURA PER REAZIONE REDOX**( data 19.021996)

- 5) scrivo la reazione come presentata ( cioè non completa e non bilanciata)

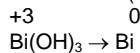


.....no.....

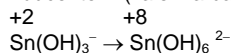


- 6) verifico quale è l'ossidante e il riducente ( sapendo che ossidante + e<sup>-</sup> → riducente) dai numeri di ossidazione

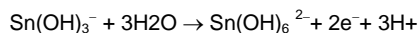
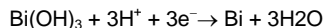
ossidante A (valenza + alta) + elettroni  $\rightarrow$  A (valenza + bassa)



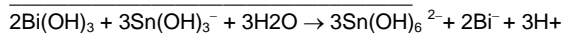
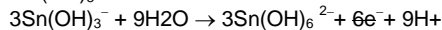
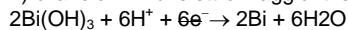
riducente B (valenza bassa o negativa)  $\rightarrow$  B (valenza + alta)



7) scrivo le semireazioni dell'ossidante e riducente (ai reagenti aggiungo  $\text{H}^+$  oppure  $\text{H}_2\text{O}$  e elettroni)



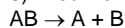
4) bilancio il n° di elettroni aggiunti e tolti; semplifico e sommo



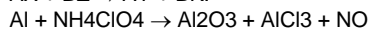
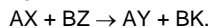
Sistema veloce (poco sicuro): osservo la reazione e spesso mancano  $\text{H}^+$  o  $\text{H}_2\text{O}$ ; in questo caso si poteva pensare di bilanciare direttamente: la reazione poteva all'apparenza sembrare già bilanciata

### PROCEDURA PER REAZIONE REDOX (data 08.01.1996)

8) scrivo la reazione come presentata (cioè non completa e non bilanciata)

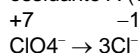


no.....

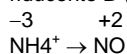


9) verifico quale è l'ossidante e il riducente (sapendo che ossidante +  $\text{e}^- \rightarrow$  riducente) dai numeri di ossidazione

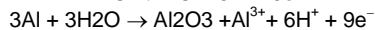
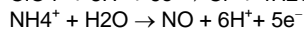
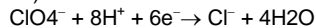
ossidante A (valenza + alta) + elettroni  $\rightarrow$  A (valenza + bassa)



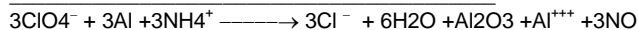
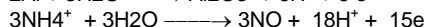
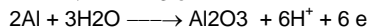
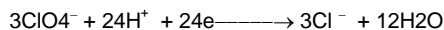
riducente B (valenza bassa o negativa)  $\rightarrow$  B (valenza + alta)



10) scrivo le semireazioni dell'ossidante e riducente (ai reagenti aggiungo  $\text{H}^+$  oppure  $\text{H}_2\text{O}$  e elettroni)

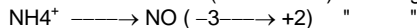
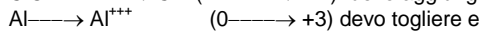
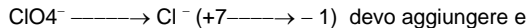


4) bilancio il n° di elettroni aggiunti e tolti; semplifico e sommo

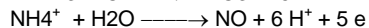
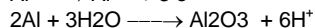
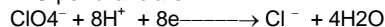


### OBIETTIVO REAZIONI REDOX

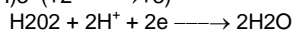
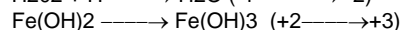
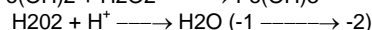
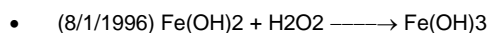
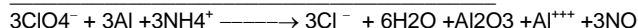
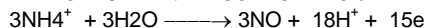
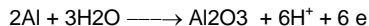
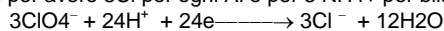
Completa e bilancia le seguenti reazioni

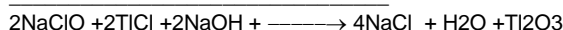
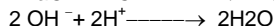
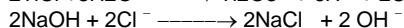
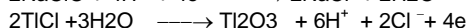
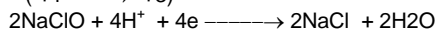
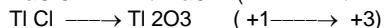
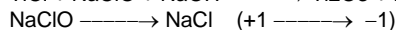
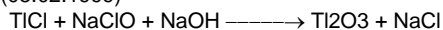
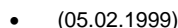
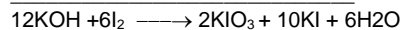
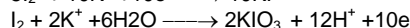
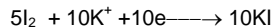
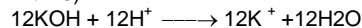
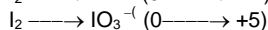
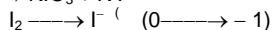
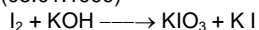
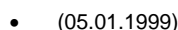
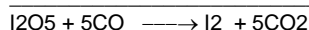
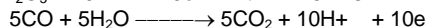
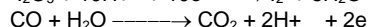
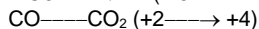
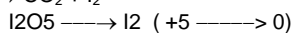
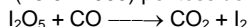
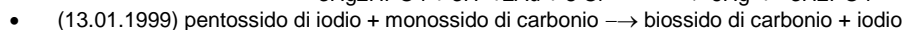
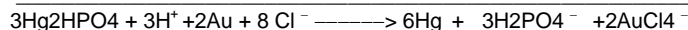
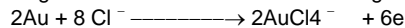
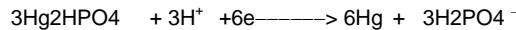
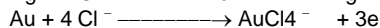
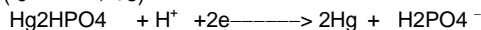
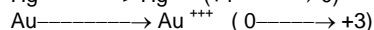
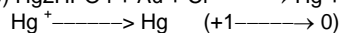
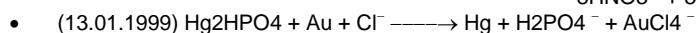
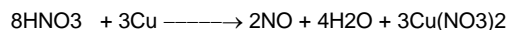
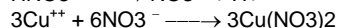
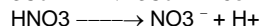
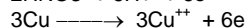
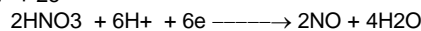
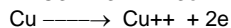
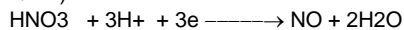
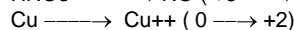
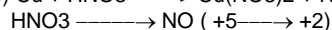
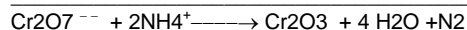
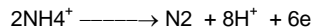
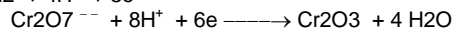
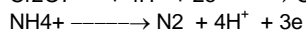
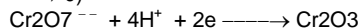
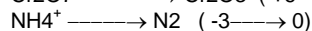
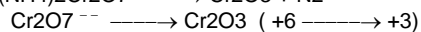
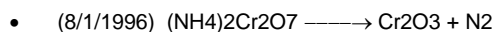
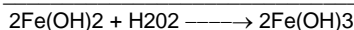
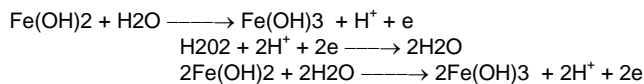


Aggiungo  $\text{H}^+$  o  $\text{H}_2\text{O}$  per bilanciare



Moltiplico per 3 per avere 3Cl per ogni Al e per 3  $\text{NH}_4^+$  per bilanciare e



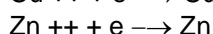
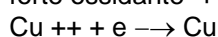


PROBLEMA :

in una soluzione sono presenti contemporaneamente ioni  $\text{Cu}^{++}$  e  $\text{Zn}^{++}$  e metallo  $\text{Cu}$  e  $\text{Zn}$ . Come evolverà la eventuale reazione? Come si calcola il peso equivalente?

controllo la tavola dei potenziali standard di riduzione che è scritta generalmente dai più ossidanti ai più riducenti

forte ossidante + e  $\longrightarrow$  riducente



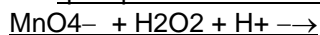
Debole ossidante + e  $\longrightarrow$  riducente

Dunque le semireazioni saranno :  $\text{Cu}^{++} + 2\text{e} \longrightarrow \text{Cu}$  ;  $\text{Zn} \longrightarrow \text{Zn}^{++} + 2\text{e}$

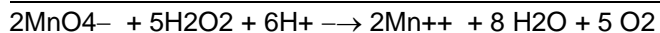
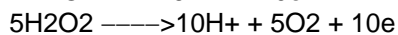
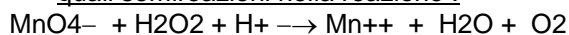
Il PE  $\text{Cu}^{++} = \text{PM}/2$  ;

**Problema :** \_\_\_\_\_

- quali prodotti dalla reazione:



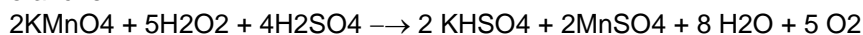
- quali semireazioni nella reazione :



- prova a scrivere la reazione completa :

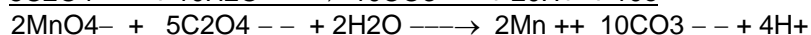
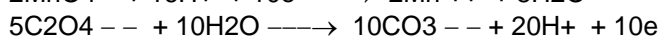
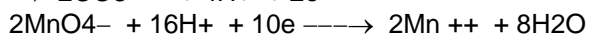
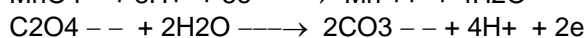
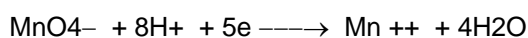


o anche

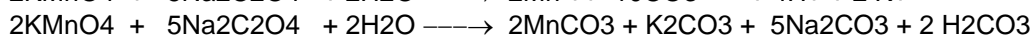
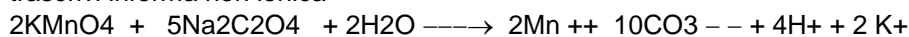


**problema** \_\_\_\_\_ permanganato e ossalato di sodio

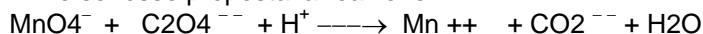
- completa e bilancia  $\text{MnO}_4^- + \text{C}_2\text{O}_4^{--} + \text{H}_2\text{O} \longrightarrow \text{Mn}^{++} + \text{CO}_3^{--} + \text{H}^+$



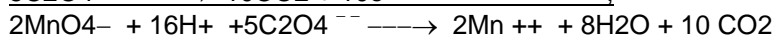
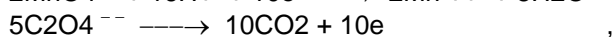
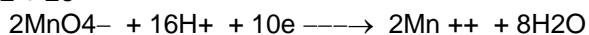
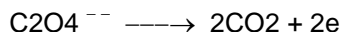
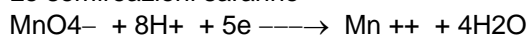
trascrivi in forma non ionica



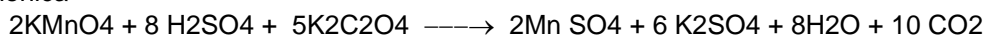
- e se fosse proposta la reazione :



Le semireazioni saranno



trascrivi in forma non ionica



**problema** \_\_\_\_\_

nella reazione

