

ASSESSMENT

1. Gold can be plated out of a solution containing  $\text{Au}^{3+}$  according

to the following half-reaction:  $\text{Au}^{3+}(\text{aq}) + 3\text{e}^- \rightarrow \text{Au}(\text{s})$

What mass of gold (in grams) can be plated by the flow of

0.5A of current for 5 minutes

GIVEN  $\text{Au}^{3+}(\text{aq}) + 3\text{e}^- \rightarrow \text{Au}(\text{s})$

0.5A, 5min ;  $0.5\text{A} = 0.5 \frac{\text{C}}{\text{s}}$  ;  $1 \text{ mole e}^- = 96500 \text{C}$

SOLUTION  $3 \text{ mole e}^- = 1 \text{ mole Au}$

$$0.5 \frac{\text{C}}{\text{s}} \cdot 5 \text{ min} \cdot 60 \frac{\text{s}}{\text{min}} \cdot \frac{1 \text{ mole e}^-}{96500 \text{C}} \cdot \frac{1 \text{ mole Au}}{3 \text{ mole e}^-} = \frac{1}{1930} \text{ mole Au}$$

$$\frac{1}{1930} \text{ mole Au} \cdot 196.97 \text{ g/mol} = 0.1020 \text{ g Au}$$

$$= 0.10 \text{ g Au}$$

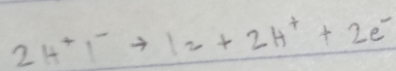
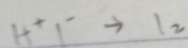
ANSWER

2. Complete and balance the following redox equation using the

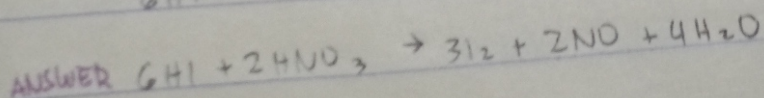
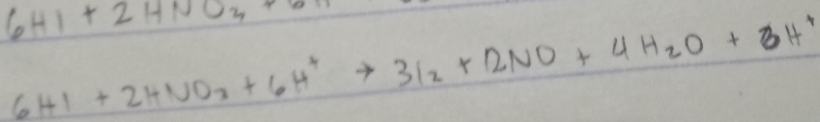
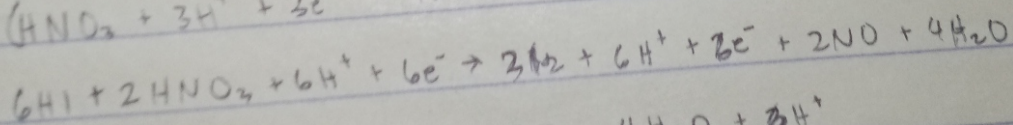
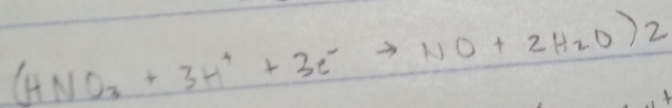
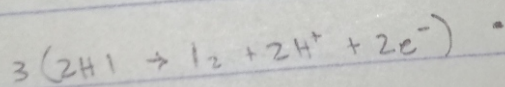
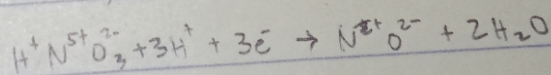
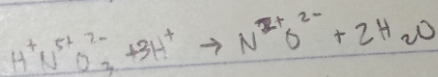
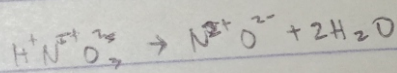
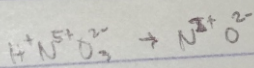
set of smallest whole-number coefficients.

GIVEN  $\text{H}^+\text{I}^- + \text{H}^+\text{N}^{5+}\text{O}_3^{2-} \rightarrow \text{I}_2 + \text{N}^{3+}\text{O}^{2-}$

SOLUTION ANODE

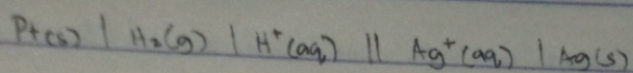


CATHODE

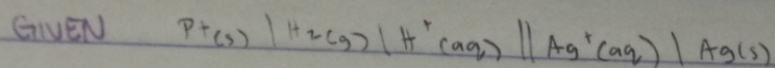




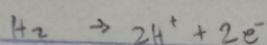
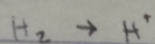
3. Given the following notation for an electrochemical cell



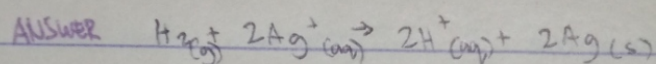
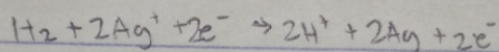
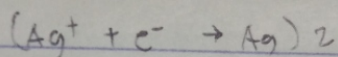
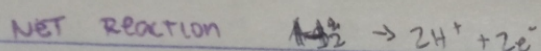
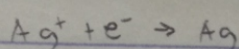
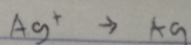
What is the balanced overall (net) cell reaction



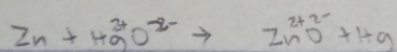
SOLUTION ANODE



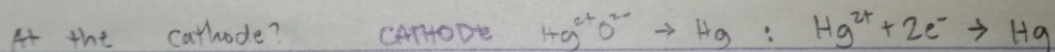
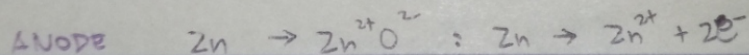
CATHODE



4. A certain electrochemical cell has for its cell reaction:

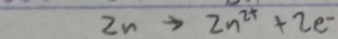
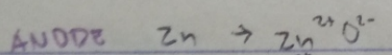


Which is the half-reaction occurring at the anode?

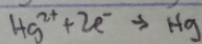
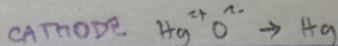


Write each half-cell reaction and the net reaction

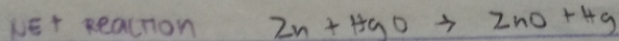
with the potential difference for the cell.



$$E^\circ = -0.76\text{V}$$



$$+0.85\text{V}$$



POTENTIAL

DIFFERENCE

$$E_{\text{cell}}^\circ = E_{\text{cathode}}^\circ - E_{\text{anode}}^\circ$$

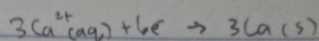
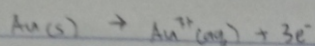
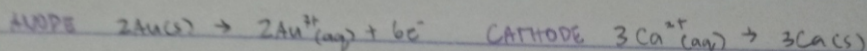
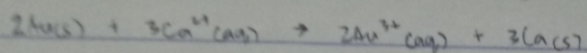
$$= 0.85\text{V} - (-0.76\text{V})$$

ANSWER

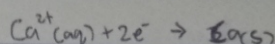
$$= 1.61\text{V}$$



5. Calculate the value of  $E^\circ_{\text{cell}}$  for the following reaction:



$$E^\circ_{\text{anode}} = 1.50 \text{ V}$$



$$E^\circ_{\text{cathode}} = -2.87 \text{ V}$$

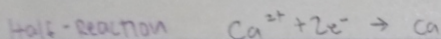
$$E^\circ_{\text{cell}} = E^\circ_{\text{cathode}} - E^\circ_{\text{anode}}$$

$$= -2.87 \text{ V} - 1.50 \text{ V}$$

$$= -4.37 \text{ V}$$

6. How many coulombs (C) of electrical charge must

pass through an electrolytic cell to reduce  $0.44 \text{ mol Ca}^{2+}$  ion to calcium metal?

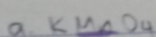


$$2 \text{ mol e}^- = 1 \text{ mol Ca}$$

SOLUTION  $0.44 \text{ mol Ca}^{2+} \cdot \frac{2 \text{ mol e}^-}{1 \text{ mol Ca}^{2+}} \cdot \frac{96500 \text{ C}}{1 \text{ mol e}^-} = 84920 \text{ C}$

ANSWER  $84920 \text{ C}$

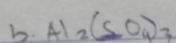
7. Determine Oxidation number of the underlined element:



$$\text{K}^+ \text{Mn}^{7+} \text{O}_4^{2-}$$

$$+1 + 2 + (-2(4)) = 0$$

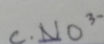
ANSWERS +7



$$\text{Al}^{3+} (\text{S}^{+6} \text{O}_4^{2-})_3$$

$$+3(2) + (3)(+6) + (-2(4)) = 0$$

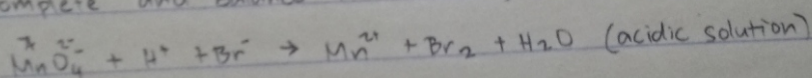
$$+6$$



$$\text{N}^{+5} \text{O}^{2-} \text{O}^{2-}$$

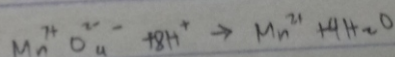
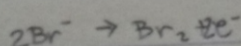
$$+1 + (-2) = -1$$

8. Complete and balance the following redox equation

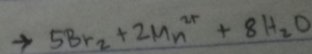
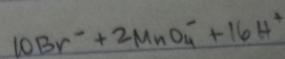
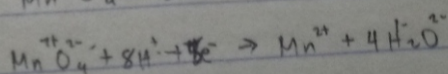


OXIDATION

REDUCTION



ANSWER



net  
reaction

