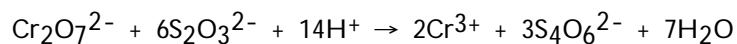


Name _____

1) _____ is the oxidizing agent in the reaction below.

1) _____

A) Cr^{3+} B) H^+ C) $\text{S}_2\text{O}_3^{2-}$ D) $\text{Cr}_2\text{O}_7^{2-}$ E) $\text{S}_4\text{O}_6^{2-}$ 2) What is the oxidation number of manganese in the MnO_4^{1-} ion?

2) _____

A) +2

B) +7

C) +4

D) +1

E) +5

3) The balanced half-reaction in which chlorine gas is reduced to the aqueous chloride ion is a _____ process.

3) _____

A) six-electron

B) one-electron

C) two-electron

D) three-electron

E) four-electron

4) The electrode at which oxidation occurs is called the _____.

4) _____

A) anode

B) cathode

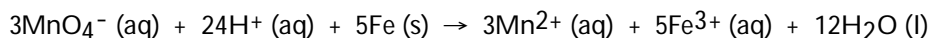
C) voltaic cell

D) oxidizing agent

E) reducing agent

5) The half-reaction occurring at the anode in the balanced reaction shown below is _____.

5) _____

A) $2\text{MnO}_4^- (\text{aq}) + 12\text{H}^+ (\text{aq}) + 6\text{e}^- \rightarrow 2\text{Mn}^{2+} (\text{aq}) + 3\text{H}_2\text{O} (\text{l})$ B) $\text{Fe}^{2+} (\text{aq}) \rightarrow \text{Fe}^{3+} (\text{aq}) + \text{e}^-$ C) $\text{Fe} (\text{s}) \rightarrow \text{Fe}^{3+} (\text{aq}) + 3\text{e}^-$ D) $\text{Fe} (\text{s}) \rightarrow \text{Fe}^{2+} (\text{aq}) + 2\text{e}^-$ E) $\text{MnO}_4^- (\text{aq}) + 8\text{H}^+ (\text{aq}) + 5\text{e}^- \rightarrow \text{Mn}^{2+} (\text{aq}) + 4\text{H}_2\text{O} (\text{l})$

6) In a voltaic cell, electrons flow from the _____ to the _____.

6) _____

A) anode, salt bridge

B) cathode, anode

C) salt bridge, anode

D) anode, cathode

E) salt bridge, cathode

7) The more _____ the value of E°_{red} , the greater the driving force for reduction.

7) _____

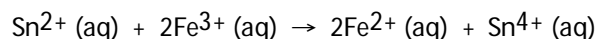
- A) negative
- B) extensive
- C) exothermic
- D) positive
- E) endothermic

Table 20.2

Half-reaction	E° (V)
$\text{Cr}^{3+}(\text{aq}) + 3\text{e}^- \rightarrow \text{Cr}(\text{s})$	-0.74
$\text{Fe}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Fe}(\text{s})$	-0.440
$\text{Fe}^{3+}(\text{aq}) + \text{e}^- \rightarrow \text{Fe}^{2+}(\text{s})$	+0.771
$\text{Sn}^{4+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Sn}^{2+}(\text{aq})$	+0.154

8) The standard cell potential (E°_{cell}) for the voltaic cell based on the reaction below is _____ V.

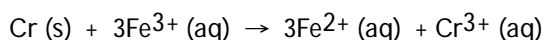
8) _____



- A) +0.46
- B) +0.617
- C) +1.21
- D) -0.46
- E) +1.39

9) The standard cell potential (E°_{cell}) for the voltaic cell based on the reaction below is _____ V.

9) _____



- A) +1.51
- B) +3.05
- C) +2.99
- D) +1.57
- E) -1.45

10) Corrosion of iron is retarded by _____.

10) _____

- A) high pH conditions
- B) the presence of salts
- C) low pH conditions
- D) both the presence of salts and high pH conditions
- E) both the presence of salts and low pH conditions

11) What current (in A) is required to plate out 1.22 g of nickel from a solution of Ni^{2+} in 1.0 hour _____?

11) _____

- A) 1.11
- B) 4.01×10^3
- C) 65.4
- D) 2.34
- E) 12.9

12) How many grams of Ca metal are produced by the electrolysis of molten CaBr_2 using a current of 30.0 amp for 10.0 hours _____?

12) _____

- A) 448
- B) 22.4
- C) 0.0622
- D) 112
- E) 224

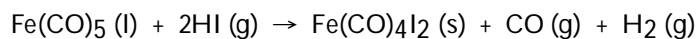
13) How many grams of CuS are obtained by passing a current of 12 A through a solution of CuSO_4 for 15 minutes _____?

13) _____

- A) 3.6
- B) 0.016
- C) 7.1
- D) 1.8
- E) 14

14) Which element is oxidized in the reaction below?

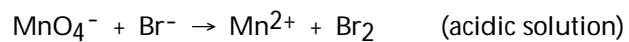
14) _____



- A) O B) Fe C) I D) C E) H

15) What is the coefficient of the permanganate ion when the following equation is balanced?

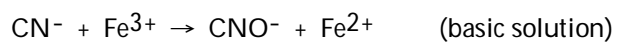
15) _____



- A) 2 B) 3 C) 4 D) 1 E) 5

16) What is the coefficient of Fe^{3+} when the following equation is balanced?

16) _____



- A) 1 B) 2 C) 3 D) 4 E) 5

17) Which transformation could take place at the anode of an electrochemical cell?

17) _____

- A) $\text{CO}_2 \rightarrow \text{C}_2\text{O}_4^{2-}$
B) $\text{VO}_2^+ \rightarrow \text{VO}^{2+}$
C) $\text{H}_2\text{AsO}_4 \rightarrow \text{H}_3\text{AsO}_3$
D) $\text{NO} \rightarrow \text{NO}_3^-$
E) $\text{O}_2 \rightarrow \text{H}_2\text{O}_2$

Table 20.1

Half Reaction	E° (V)
$F_2(g) + 2e^- \rightarrow 2F^-(aq)$	+2.87
$Cl_2(g) + 2e^- \rightarrow 2Cl^-(aq)$	+1.359
$Br_2(l) + 2e^- \rightarrow 2Br^-(aq)$	+1.065
$O_2(g) + 4H^+(aq) + 4e^- \rightarrow 2H_2O(l)$	+1.23
$Ag^+ + e^- \rightarrow Ag(s)$	+0.799
$Fe^{3+}(aq) + e^- \rightarrow Fe^{2+}(aq)$	+0.771
$I_2(s) + 2e^- \rightarrow 2I^-(aq)$	+0.536
$Cu^{2+} + 2e^- \rightarrow Cu(s)$	+0.34
$2H^+ + 2e^- \rightarrow H_2(g)$	0
$Pb^{2+} + 2e^- \rightarrow Pb(s)$	-0.126
$Ni^{2+} + 2e^- \rightarrow Ni(s)$	-0.28
$Li^+ + e^- \rightarrow Li(s)$	-3.05

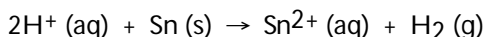
18) Which of the halogens in Table 20.1 is the strongest oxidizing agent?

18) _____

- A) F_2
- B) I_2
- C) Br_2
- D) Cl_2
- E) All of the halogens have equal strength as oxidizing agents.

19) Consider an electrochemical cell based on the reaction:

19) _____



Which of the following actions would not change the measured cell potential?

- A) addition of more tin metal to the anode compartment
- B) increasing the tin (II) ion concentration in the anode compartment
- C) increasing the pressure of hydrogen gas in the cathode compartment
- D) lowering the pH in the cathode compartment
- E) Any of the above will change the measured cell potential.

20) In the equation $2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$, hydrogen gives up electrons and is a reductant.

20) _____

21) The electrode where reduction occurs is called the anode.

21) _____

22) In a voltaic cell electrons flow from the anode to the cathode.

22) _____

23) When the cell potential is negative in a voltaic cell the cell reaction will not proceed spontaneously.

23) _____

24) The standard reduction potential, E_{red}° , is proportional to the stoichiometric coefficient.

24) _____

25) A positive number for maximum useful work in a spontaneous process (voltaic cell) indicates that the cell will perform work on its surroundings.

25) _____