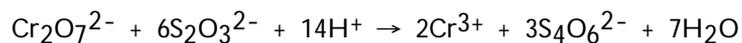


Name _____

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

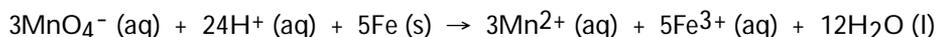
3) The balanced half-reaction in which chlorine gas is reduced to the aqueous chloride ion is a _____ process. 3) _____

- 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) _____

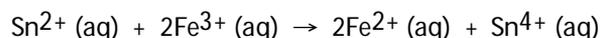
- A) anode, salt bridge
B) cathode, anode
C) salt bridge, anode
D) anode, cathode
E) salt bridge, cathode

- 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

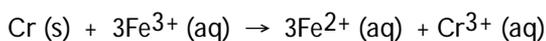
Half-reaction	E° (V)
$\text{Cr}^{3+}(\text{aq}) + 3\text{e}^- \rightarrow \text{Cr}(\text{s})$	-0.74
$\text{Fe}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Fe}(\text{s})$	-0.440
$\text{Fe}^{3+}(\text{aq}) + \text{e}^- \rightarrow \text{Fe}^{2+}(\text{s})$	+0.771
$\text{Sn}^{4+}(\text{aq}) + 2\text{e}^-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

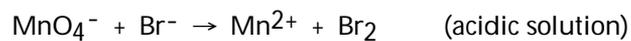
- A) 3.6 B) 0.016 C) 7.1 D) 1.8 E) 14

14) Which element is oxidized in the reaction below? 14) _____



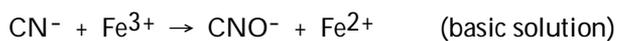
- A) O B) Fe C) I D) C E) H

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) _____

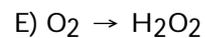
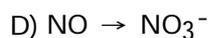
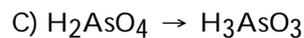
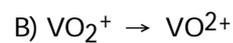
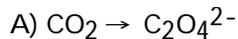


Table 20.1

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) _____
- $$2H^+(aq) + Sn(s) \rightarrow Sn^{2+}(aq) + H_2(g)$$
- 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) _____