Chemistry 141 Name

Dr Cary Willard

Quiz 5 (20 points) March 6, 2012

1. (10 points) Balance the following redox reaction in acid. Show the two half reactions and tell which is an oxidation and which is a reduction.

Cr2O7-2(aq) + Zn(aq) 🡪 Zn+2(aq) + Cr+3(aq)

Half reaction 1 - (oxidation or reduction)

Cr2O7-2(aq) + 14 H+(aq) + 6 e– 🡪 2 Cr+3(aq) + 7 H2O(l)

Half reaction 2 - (oxidation or reduction)

(Zn(aq) 🡪 Zn+2(aq) + 2 e–) 3

3 Zn(aq) 🡪 3 Zn+2(aq) + 6 e–

Overall reaction balanced in acid

Cr2O7-2*(aq)* + 14 H*+(aq)* + 6 e– + 3 Zn*(aq)* 🡪 2 Cr+3*(aq)* + 7 H2O*(l)* + 3Zn+2*(aq)* + 6 e–

Cr2O7-2*(aq)* + 14 H*+(aq)* + 3 Zn*(aq)* 🡪 2 Cr+3*(aq)* + 7 H2O*(l)* + 3Zn+2*(aq)*

1. (10 points) Balance the following redox reaction in base. Show the two half reactions and tell which is an oxidation and which is a reduction.

MnO4-1 + CN-1 🡪 MnO2 + CNO-1

Half reaction 1 - (oxidation or reduction)

2 (MnO4-1 + 4 H+ + 3 e–🡪 MnO2 + 2 H2O)

2 MnO4-1 + 8 H+ + 6 e–🡪 2 MnO2 + 4 H2O

Half reaction 2 - (oxidation or reduction)

3(CN-1 + H2O 🡪 CNO-1+ 2 H+ + 2 e–)

3 CN-1 + 3 H2O 🡪 3 CNO-1+ 6 H+ + 6 e–

Overall reaction balanced in acid (optional)

2 MnO4-1 + 8 H+ + 6 e– + 3 CN-1 + 3 H2O 🡪 2 MnO2 + 4 H2O + 3 CNO-1 + 6 H+ + 6 e–

2 MnO4-1 + 2 H+ + 3 CN-1 🡪 2 MnO2 + H2O + 3 CNO-1

Overall reaction balanced in base

2 MnO4-1 + 2 H+ + 3 CN-1 🡪 2 MnO2 + H2O + 3 CNO-1

2 H2O 🡪 2 H+ + 2 OH−

2 MnO4-1 + 2 H2O + 3 CN-1 🡪 2 MnO2 + H2O + 3 CNO-1 + 2 OH−

2 MnO4-1 + H2O + 3 CN-1 🡪 2 MnO2 + 3 CNO-1 + 2 OH−

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1. (10 points) Balance the following redox reaction in acid. Show the two half reactions and tell which is an oxidation and which is a reduction.

MnO4-1(aq) + C2O4-2(aq) 🡪 Mn+2(aq) + CO2(g)

Half reaction 1 - (oxidation or reduction)

(8 H+ + MnO4-1(aq) + 5 e– 🡪 Mn+2(aq) + 4 H2O)2

16 H+ + 2 MnO4-1(aq) + 10 e– 🡪2 Mn+2(aq) + 8 H2O

Half reaction 2 - (oxidation or reduction)

(C2O4-2(aq) 🡪 2 CO2(g) + 2 e–)5

5 C2O4-2(aq) 🡪 10 CO2(g) + 10 e–

Overall reaction balanced in acid

16 H+ + 2 MnO4-1(aq) + 10 e– + 5 C2O4-2(aq) 🡪2 Mn+2(aq) + 8 H2O + 10 CO2(g) + 10 e–

16 H+ + 2 MnO4-1(aq) + 5 C2O4-2(aq) 🡪2 Mn+2(aq) + 8 H2O + 10 CO2(g)

1. (10 points) Balance the following redox reaction in base. Show the two half reactions and tell which is an oxidation and which is a reduction.

MnO4-1 + I-1 🡪 MnO2 + IO3-1

Half reaction 1 - (oxidation or reduction)

2 (MnO4-1 + 4 H+ + 3 e–🡪 MnO2 + 2 H2O)

2 MnO4-1 + 8 H+ + 6 e–🡪 2 MnO2 + 4 H2O

Half reaction 2 - (oxidation or reduction)

I-1 + 3 H2O 🡪 + IO3-1+ 6 H+ + 6 e–

Overall reaction balanced in acid (optional)

2 MnO4-1 + 8 H+ + 6 e– + I-1 + 3 H2O 🡪 2 MnO2 + 4 H2O + IO3-1+ 6 H+ + 6 e–

2 MnO4-1 + 2 H+ + I-1 🡪 2 MnO2 + H2O + IO3-1

Overall reaction balanced in base

2 MnO4-1 + 2 H+ + I-1 🡪 2 MnO2 + H2O + IO3-1

2 H2O 🡪 2 H+ + 2 OH−

2 MnO4-1 + I-1 + H2O 🡪 2 MnO2 + 2 OH−+ IO3-1