Quiz: Ch 19-20 **Name:**
Version M (32 pts) **I have not received or given, nor will give any aid on this exam.**
AP Chemistry **April 7, 2006** **Period: 1 2 3 4**

Show your work for all problems and include sensible units. No work (i.e., no reasonable justification) = no credit.

1. (20 pts) Consider the following balanced reaction, which occurs at 25ºC:

$$2\ Al\ (s) + 3\ Cl_2\ (g) \leftrightarrow 2\ AlCl_3\ (s)$$

S° (J/K·mol): Al (s) = 28 Cl_2 (g) = 223 $AlCl_3$ (s) = 111

   a. (5 pts) Calculate ΔS° for this reaction.

ΔS° =

   b. (5 pts) Calculate E^{o}_{cell} for this reaction.

E_{cell}° =

   c. (5 pts) Calculate ΔG° for this reaction.

ΔG° =

   d. (7 pts) Calculate $\Delta H°_{formation}$ of $AlCl_3$ (s).

ΔH_f° =

e. (5 pts) If the reaction is reversed when connected to a 9-V battery, which produces a current of 50.0 A for 3.0 minutes, how many moles of Al (s) would be produced?

moles Al =

f. (5 pts) If ΔG of the reaction is -1450 kJ/mol, then what is the value of the ion-product constant, Q?

Q =

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1. (20 pts) Consider the following balanced reaction, which occurs at 25ºC:

$$2\ Cr\ (s) + 3\ I_2\ (s) \leftrightarrow 2\ CrI_3\ (s)$$

S° (J/K·mol): Cr (s) = 24 I_2 (s) = 116 CrI_3 (s) = 102

a. (5 pts) Calculate E^{o}_{cell} for this reaction.

$E_{cell}° =$

b. (5 pts) Calculate $\Delta G°$ for this reaction.

$\Delta G° =$

c. (5 pts) Calculate $\Delta S°$ for this reaction.

$\Delta S° =$

d. (7 pts) Calculate $\Delta H°_{formation}$ of CrI_3 (s).

$\Delta H_f° =$

e. (5 pts) If the reaction is reversed when connected to a 9-V battery, which produces a current of 40.0 A for 6.0 minutes, how many moles of I_2 (s) would be produced?

moles Al =

f. (5 pts) If ΔG of the reaction is -750 kJ/mol, then what is the value of the ion-product constant, Q?

Q =

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Version O (32 pts) **I have not received or given, nor will give any aid on this exam.**
AP Chemistry **April 7, 2006** **Period: 1 2 3 4**

Show your work for all problems and include sensible units. No work (i.e., no reasonable justification) = no credit.

1. (20 pts) Consider the following balanced reaction, which occurs at 25ºC:

$$2\ Hg\ (l) + CaCl_2\ (s) \leftrightarrow Hg_2Cl_2\ (s) + Ca\ (s)$$

S° (J/K·mol): Hg (l) = 77.4 $CaCl_2$ (s) = 104.6
Ca (s) = 41.4 Hg_2Cl_2 (s) = 192.5

ΔH_f^o (kJ/mol): $CaCl_2$ (s) = -795.8

a. (5 pts) Calculate E^o_{cell} for this reaction.

$E_{cell}° =$

b. (5 pts) Calculate ΔG° for this reaction.

ΔG° =

c. (5 pts) Calculate ΔS° for this reaction.

ΔS° =

d. (7 pts) Calculate $\Delta H°_{formation}$ of Hg_2Cl_2 (s).

$\Delta H_f° =$

e. (5 pts) If ΔG of the reaction is -600.0 kJ/mol at 30.0 ºC, then what is the value of the ion-product constant, Q?

Q =

f. (5 pts) If the reaction is reversed when connected to a 9-V battery, what current, applied for 2.00 minutes, will produce 0.240 moles of Hg (l)?

Current =