Dougherty Valley HS AP Chemistry
Electrochemistry – Extra Practice Oxidation and Reduction

WORKSHEET #3* KEY

Name: **Date:** **Period:** **Seat #:**

Directions: Any worksheet that is labeled with an * means it is suggested extra practice. We do not always have time to assign every possible worksheet that would be good practice for you to do. You can do this worksheet when you have extra time, when you finish something early, or to help you study for a quiz or a test. If and when you choose to do this Extra Practice worksheet, please do the work on binder paper. You will include this paper stapled into your Rainbow Packet when you turn it in, even if you didn't do any of this. We want to make sure we keep it where it belongs so you can do it later if you want to (or need to). If you did the work on binder paper you can include that in your Rainbow Packet after this worksheet. If we end up with extra class time then portions of this may turn into required work. If that happens you will be told which problems are turned into required. Remember there is tons of other extra practice on the class website…and the entire internet! See me if you need help finding practice on a topic you are struggling with.

Show all work

Balance a-d by the half reaction method:

[a]

$MnO_4^- + SO_3^{2-} \rightarrow Mn^{2+} + SO_4^{2-}$ **R**: $16H^+ + 2MnO_4^- + 10e^- \rightarrow 2Mn^{2+} + 8H_2O$ **O**: $5SO_3^{2-} + 5H_2O \rightarrow 5SO_4^{2-} + 10H^+ + 10e^-$

$\mathbf{6}H^+ + \mathbf{2}MnO_4^- + \mathbf{5}SO_3^{2-} \rightarrow \mathbf{2}Mn^{2+} + \mathbf{5}SO_4^{2-} + \mathbf{3}H_2O$

[b]

$H_2O_2 + I^- \rightarrow H_2O + I_2$ **R**: $H_2O_2 + 2H^+ + 2e^- \rightarrow 2H_2O$ **O**: $2I^- \rightarrow I_2 + 2e^-$

$H_2O_2 + \mathbf{2}I^- + \mathbf{2}H^+ \rightarrow \mathbf{2}H_2O + I_2$

[c]

$AsO_3^{3-} + I_2 \rightarrow AsO_4^{3-} + I^-$ **R**: $I_2 + 2e^- \rightarrow 2I^-$ **O**: $AsO_3^{3-} + H_2O \rightarrow AsO_4^{3-} + 2H^+ + 2e^-$

$AsO_3^{3-} + I_2 + H_2O \rightarrow AsO_4^{3-} + \mathbf{2}I^- + \mathbf{2}H^+$

[d]

$Cr + ClO_4^- \rightarrow CrO_2^- + ClO_3^-$ **R**: $2ClO_4^- + 4H^+ + 4e^- \rightarrow 2ClO_3^- + 2H_2O$ **O**: $2H_2O + Cr \rightarrow CrO_2^- + 4H^+ + 4e^-$

$Cr + \mathbf{2}ClO_4^- \rightarrow CrO_2^- + \mathbf{2}ClO_3^-$

Balance the following redox reactions in acidic solutions:

[e] $\mathbf{6}HNO_3 + S \rightarrow \mathbf{6}NO_2 + H_2SO_4 + \mathbf{2}H_2O$

[f] $\mathbf{2}KMnO_4 + \mathbf{6}HCl + \mathbf{5}H_2S \rightarrow \mathbf{2}KCl + \mathbf{2}MnCl_2 + \mathbf{5}S + \mathbf{8}H_2O$

[g] $\mathbf{2}FeCl_3 + H_2S \rightarrow \mathbf{2}FeCl_2 + \mathbf{2}HCl + S$

[h] $Cu + HNO_3 \rightarrow Cu(NO_3)_2 + NO_2$

[i] $\mathbf{2}NaCl + \mathbf{2}H_2SO_4 + MnO_2 \rightarrow Na_2SO_4 + MnSO_4 + \mathbf{2}Cl_2 + \mathbf{2}H_2O$

[j] $\mathbf{2}HMnO_4 + \mathbf{14}HCl \rightarrow \mathbf{2}MnCl_2 + \mathbf{5}Cl_2 + \mathbf{8}H_2O$

[k] $\mathbf{6}FeCl_2 + K_2Cr_2O_7 + \mathbf{14}HCl \rightarrow \mathbf{6}FeCl_3 + \mathbf{2}KCl + \mathbf{2}CrCl_3 + \mathbf{7}H_2O$

[l] $\mathbf{3}Hg + \mathbf{8}HNO_3 \rightarrow \mathbf{3}Hg(NO_3)_2 + \mathbf{2}NO + \mathbf{4}H_2O$

[m] $\mathbf{2}SbO_5 + \mathbf{14}KI + \mathbf{20}HCl \rightarrow \mathbf{2}SbCl_3 + \mathbf{14}KCl + \mathbf{7}I_2 + \mathbf{10}H_2O$

[n] $\mathbf{2}KMnO_4 + \mathbf{4}H_2SO_4 \rightarrow \mathbf{3}H_2O_2 + \mathbf{2}KHSO_4 + \mathbf{2}MnSO_4 + O_2$