Name: ANSWERS **Galvanic Cell & Cell Potential Quiz**

20/20

1. The cell potential for the following galvanic cell is given:

$$Zn_{(s)} \,|\, Zn^{2+}_{(aq)} \,||\, Pd^{2+}_{(aq)} \,|\, Pd_{(s)} \;,\; E^{o}_{cell} = +1.750\ V$$

a) Write the oxidation and reduction half-reactions for the galvanic cell (2)

$Zn_{(s)} \rightarrow Zn^{+2}_{(aq)} + 2e^-$ oxidation ✓1

$Pd^{+2}_{(aq)} + 2e^- \rightarrow Pd_{(s)}$ reduction ✓2

b) Identify the oxidizing and reducing agents (2)

reducing agent = $Zn_{(s)}$ ✓1

oxidizing agent = $Pd^{+2}_{(aq)}$ ✓2

c) Determine the standard reduction potential for the cathode half-reaction, E^{o}_{anode} = -0.76V (4)

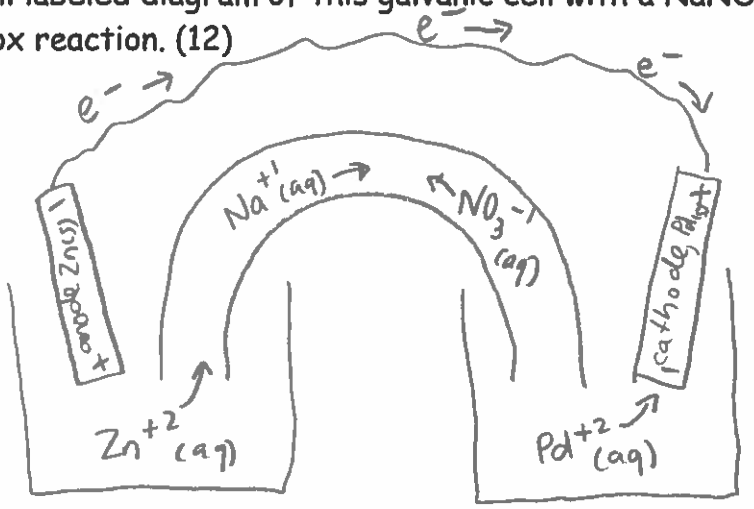
$E^{o}_{cell} = E^{o}_{cathode} - E^{o}_{anode}$

✓1 $E^{o}_{cathode} = E^{o}_{cell} + E^{o}_{anode}$

$= (+1.750) + (-0.76V)$

$= +0.99V$ ✓2 ✓3 ✓4

d) Draw a full labeled diagram of this galvanic cell with a $NaNO_{3(aq)}$ salt bridge and write the net ionic redox reaction. (12)



✓ 2-half cells
✓ salt bridge, connecting wire
✓ anode = Zn(s)
✓ cathode = Pd(s)
✓ e⁻ flow A→C
✓ anions to anode
✓ cations to cathode
✓ anode = −
✓ cathode = +
✓ oxidation ½ rx'n
✓ reduction ½ rx'n
✓ net ionic eq'n

$Zn_{(s)} \rightarrow Zn^{+2}_{(aq)} + 2e^-$

$Pd^{+2}_{(aq)} + 2e^- \rightarrow Pd_{(s)}$

$Zn_{(s)} + Pd^{+2}_{(aq)} \rightarrow Zn^{2+}_{(aq)} + Pd_{(s)}$