Student Name: **Grade:** 09

Test Name: November Chemistry for All: Unit 11 - RedOx Assessment **Version:** 1

1. Using the balanced REDOX reaction, 1 Zn (s) + 2 HCl (aq) → 1 $ZnCl_2$ (aq) + 1 H_2 (g), which of the following is the balanced reduction half-reaction?

   (a) 1 Zn (s) → 1 Zn^{2+} (aq) + 1 e^-

   (b) 2H^{1+} (aq) + 2 e^- → 1 H_2 (g)

   (c) 1 Zn (s) → 1 Zn^{2+} (aq) + 2 e^-

   (d) 1 Zn (s) + 2 e^- → 1 Zn^{2+} (aq)

2. Which of the following is true for the balanced REDOX reaction below?
   1 Fe (s) + 3 $AgNO_3$ (aq) → 3 Ag (s) + 1 $Fe(NO_3)_3$ (aq)

   (a) Iron is being reduced and loses 3 electrons

   (b) Silver is being reduced and gains 3 electrons

   (c) Iron is being oxidized and loses 3 electrons

   (d) Iron is being reduced and gains 3 electrons

3. 2 Cl^{1-} (aq) → Cl_2 (g) + _?_ e^- , is the oxidation half-reaction for chloride ions going to chlorine gas, what is the coefficient in front of the electrons?

   (a) 1

   (b) 2

   (c) 3

   (d) 4

4. Which of the following is true for the balanced REDOX reaction below?
   1 Fe (s) + 3 $AgNO_3$ (aq) → 3 Ag (s) + 1 $Fe(NO_3)_3$ (aq)

   (a) Silver and iron are being oxidized

   (b) Silver and iorn are being reduced

   (c) Silver is being oxidized and iron is being reduced

   (d) Silver is being reduced and iorn is being oxidized

5. Which of the following reaction represents a REDOX reaction?

(a) $3\ Ba(OH)_2\ (aq) + Fe_2(SO_4)_3\ (aq) \text{-----> } 2\ Fe(OH)_3\ (s) + 3\ BaSO_4\ (aq)$

(b) $Mg\ (s) + 2\ AgNO_3\ (aq) \text{-----> } 2\ Ag\ (s) + Mg(NO_3)_2\ (aq)$

(c) $MgCl_2\ (aq) + 2\ AgNO_3\ (aq) \text{-----> } 2\ AgCl\ (s) + Mg(NO_3)_2\ (aq)$

(d) $2\ Ag^{1+}\ (aq) + MgCl_2\ (aq) \text{-----> } 2\ AgCl\ (s) + Mg^{2+}\ (aq)$

6. What is transferred in a REDOX reaction?

(a) neutrons

(b) protons

(c) electrons

(d) atoms

7. When zinc metal is placed in contact with iron metal in an aqueous environment, the iron does not rust. Why does zinc metal prevent iron metal from rusting in water?

(a) Zinc loses electrons more readily than iron

(b) Zinc gains electrons more readily than iron

(c) Zn^{2+} ions gains electrons more readily than Fe^{2+} ions

(d) Zinc promotes the decomposition of rust

8. A piece of aluminum is placed in a green solution of copper (II) chloride. The wire immediately thickened and turned a reddish color and the solution over time became less green in color. What best describes the reaction?

(a) The aluminum wire is oxidizing and losing electrons to the copper ions

(b) The copper ions are oxidizing and losing electrons to the aluminum wire

(c) The aluminum wire is oxidizing and forming rust from the copper ions

(d) The aluminum wire is oxidizing and gaining electrons from the copper ions

9. Which of the following is the best reason to coat iron objects with zinc?

(a) Zinc metal is strong layer and protects the iron from rusting
(b) Zinc metal is soft and acts as a shock absorber for the iron
(c) Zinc is easily reduced and gives up electrons before iron
(d) Zinc metal is easily oxidized and gives up its electrons before iron

10. When a piece of zinc metal is placed in a solution of copper (II) sulfate, the zinc metal thickens and becomes reddish in color from a coating of copper metal. What will happen if a piece of copper is placed in a solution of zinc sulfate?

(a) No reaction will occur between copper metal and zinc sulfate
(b) The copper metal will oxidize and become coated with zinc metal
(c) The copper metal will reduce and become coated with zinc metal
(d) The copper metal thickens and gets coated with more copper metal

11. Which of the following is most likely to corrode?

(a) gold
(b) silver
(c) zinc
(d) tin

Instructions for questions 12 through 16.

For the following electrochemical cells (questions 12 - 16) use the following values for standard reduction potentials.

$Au^{3+}(aq) + 3\ e^- \text{ ------> } Au\ (s)$ $E_{red} = +1.50$ V

$Ag^{1+}(aq) + 1\ e^- \text{ ------> } Ag\ (s)$ $E_{red} = +0.80$ V

$Cu^{2+}(aq) + 2\ e^- \text{ ------> } Cu\ (s)$ $E_{red} = +0.34$ V

$Ni^{2+}(aq) + 2\ e^- \text{ ------> } Ni\ (s)$ $E_{red} = +0.26$ V

$2\ H^{1+}(aq) + 2\ e^- \text{ ------> } H_2\ (s)$ $E_{red} = +0.00$ V

$Pb^{2+}(aq) + 2\ e^- \text{ ------> } Pb\ (s)$ $E_{red} = -0.13$ V

$Cr^{3+}(aq) + 1\ e^- \text{ ------> } Cr^{2+}\ (s)$ $E_{red} = -0.41$ V

$Na^{1+}(aq) + 1\ e^- \text{ ------> } Na\ (s)$ $E_{red} = -2.71$ V

12. The following represents an electrochemical cell: $Na(s) / Na^+(aq) \,||\, Ag^+(aq) / Ag(s)$, what is the standard voltage of the cell?

(a) -3.51 V
(b) +0.80 V
(c) +2.71 V
(d) +3.51 V

13. The following represents an electrochemical cell: Pt (s) / H+ (aq) || Cu^{2+} (aq) / Cu (s) , what is the standard voltage for the cell?

(a) +0.68 V
(b) +0.34 V
(c) 0.00 V
(d) -0.34 V

14. The following represents an electrochemical cell: Ni(s) / Ni^{2+} (aq) || Cu^{2+} (aq) / Cu (s), what is the standard voltage for the cell?

(a) -0.60 V
(b) -0.26 V
(c) +0.34 V
(d) +0.60 V

15. The following represents an electrochemical cell: Pt (s) |Cr^{3+} (aq) ; Cr^{2+} (aq) || Pb^{2+} (aq) | Pb(s) , what is the standard voltage for the cell?

(a) -.54 V
(b) -.41 V
(c) -0.28 V
(d) 1.05 V

16. The following represents an electrochemical cell: Au (s) | Au^{3+} (aq) || Cu $^{2+}$ (aq) | Cu (s) , what is the standard voltage for the cell?

(a) +1.84 V
(b) +1.16 V
(c) -1.16 V
(d) -1.84 V

17. Which is true about oxidation and reduction in a electrochemical cell?

(a) both occur at the anode
(b) both occur at the cathode
(c) oxidation occurs at the anode and reduction occurs at the cathode
(d) reduction occurs at the anode and oxidation occurs at the cathode

18. Given the balanced equation representing an reaction occurring in an electrolytic cell:
$2\ NaCl(s) \rightarrow 2\ Na(s) + Cl_2(g)$ Where is Na(s) produced in the cell?

(a) at the anode, where oxidation occurs
(b) at the anode, where reduction occurs
(c) at the cathode, where oxidation occurs
(d) at the cathode, where reduction occurs

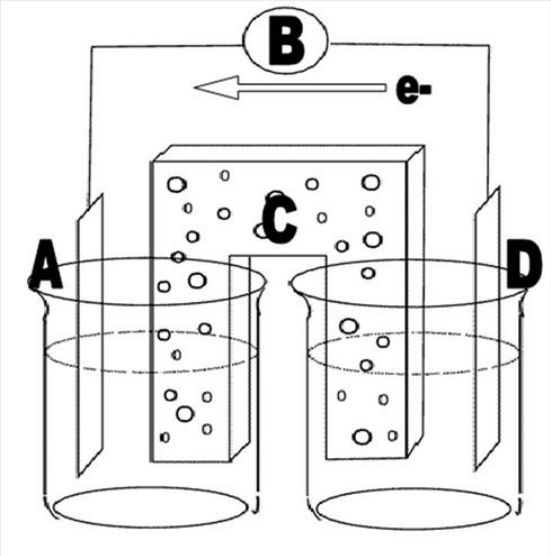
19. Reduction occurs at the cathode in an electrochemical cell. Which reaction below occurs at the cathode?

(a) sodium metal is converted to sodium ions
(b) Fe^{3+} ions are converted to Fe^{2+} ions
(c) Cr^{2+} ions are converted to Cr^{3+} ions
(d) chloride ions is converted to chlorine gas

20. Looking at the shorthand electrochemical cell below: $Pt(s)/ IO_3^-(aq), H^+(aq) \ || \ Zn^{2+}(aq) / Zn(s)$, which of the following is true?

(a) Platinum is being oxidized at the cathode
(b) Zinc is reduced at the cathode
(c) Hydrogen is oxidized at the anode
(d) Zinc is oxidized at the anode

21. Which letter represents the the most probable location of the oxidation reaction in the diagram of the electrochemical cell?



(a) A
(b) B
(c) C
(d) D