(1)

Name _____

Unit 8: Redox & Electrochemistry

Place a checkmark next to each item that you can do! If a sample problem is given, complete it as evidence.

___1. I can define oxidation, reduction, and redox reaction	**Definitions:** oxidation losing electrons reduction gaining electrons redox reaction tranfer of electrons
___2. I can assign oxidation numbers to any element.	Assign oxidation number to each of the elements below. O_2 0 Li 0 Si 0
___3. I can assign oxidation numbers to the elements in a compound.	Assign oxidation numbers to each element in the compounds below. $MnCl_3$: Mn +3 Cl -1 H_2SO_4: H +1 S +6 O -2 $Fe(NO_3)_2$ Fe: +2 N: +5 O: -2
___4. I can assign oxidation numbers to the elements in a polyatomic ion.	Assign oxidation numbers to each element in the polyatomic ions below. PO_4^{3-}: P +5 O -2 ClO_3^-: Cl +5 O -2
___5. I can distinguish between an oxidation half-reaction and a reduction half-reaction.	Which half-reaction equation represents the reduction of a potassium ion? (3) A) $K^+ + e^- \text{-----> } K$ C) $K^+ \text{-----> } K + e^-$ B) $K + e^- \text{-----> } K^+$ D) $K \text{-----> } K^+ + e^-$ Given the reaction: $Fe(s) + Cu^{2+}(aq) \rightarrow Fe^{2+}(aq) + Cu(s)$ Which half reaction correctly shows the oxidation that occurs? (3) A) $Fe(s) \rightarrow Fe^{2+}(aq) + 2e^-$ (C) $Cu^{2+}(aq) \rightarrow Cu(s) + 2e^-$ B) $Fe(s) + 2e^- \rightarrow Fe^{2+}(aq)$ D) $Cu^{2+}(aq) + 2e^- \rightarrow Cu(s)$
___6. I can state the Law of Conservation of Charge.	The law of Conservation of Charge states..... Cannot create or destroy charge! Same on both sides!

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____7. I can break a redox reaction into its two half-reactions.

The two half-reactions that come from the following equation are:

$Cr(s) + CuCl_2(aq) \text{ -----> } CrCl_3(aq) + Cu(s)$

oxidation half-reaction

$Cr^0 \rightarrow Cr^{+3} + 3e^-$

reduction half-reaction

$Cu^{+2} + 2e^- \rightarrow Cu^0$

$Li(s) + Ag^+(aq) \text{ -----> } Li^+(aq) + Ag(s)$

oxidation half-reaction

$Li^0 \rightarrow Li^+ + 1e^-$

reduction half-reaction

$Ag^+ + 1e^- \rightarrow Ag^0$

____8. I can balance the two half reactions and create a balanced redox reaction

$Al(s) + FeCl_2(aq) \text{ -----> } AlCl_3(aq) + Fe(s)$

oxidation half-reaction

$2(Al \rightarrow Al^{+3} + 3e^-)$

reduction half-reaction

$3(Fe^{+2} + 2e^- \rightarrow Fe)$

Balanced Redox Reaction

$2Al + 3Fe^{+2} \rightarrow 2Al^{+3} + 3Fe$

____9. I can balance a redox reaction.

Which simple oxidation-reduction reaction is *not* correctly balanced?

A) $Sn(s) + Cu^{2+}(aq) \rightarrow Cu(s) + Sn^{2+}(aq)$
B) $Ni(s) + Sn^{2+}(aq) \rightarrow Sn(s) + Ni^{2+}(aq)$
C) $2\ I^-(aq) + Fe^{3+}(aq) \rightarrow Fe^{2+}(aq) + I_2(s)$
D) $2\ I^-(aq) + Hg^{2+}(aq) \rightarrow Hg(\ell) + I_2(s)$

(C)

Given the balanced equation:

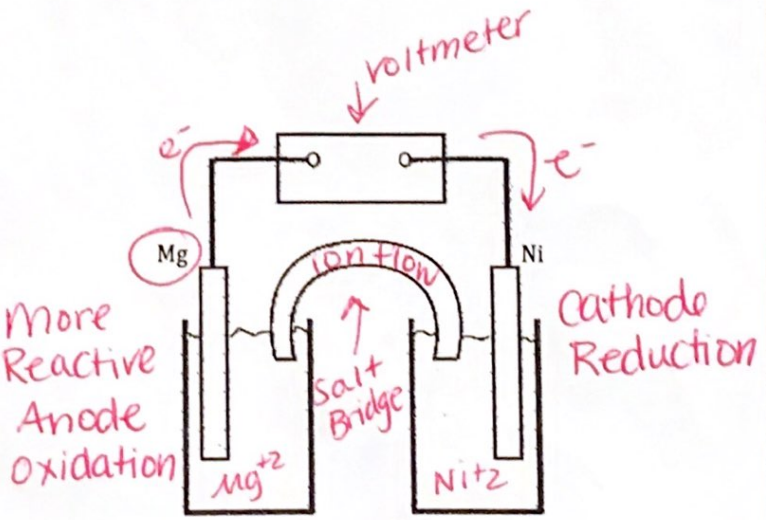
$3\ Fe^{3+}(aq) + Al(s) \rightarrow 3\ Fe^{2+}(aq) + Al^{3+}(aq)$

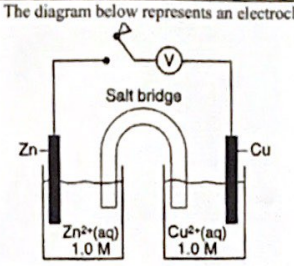
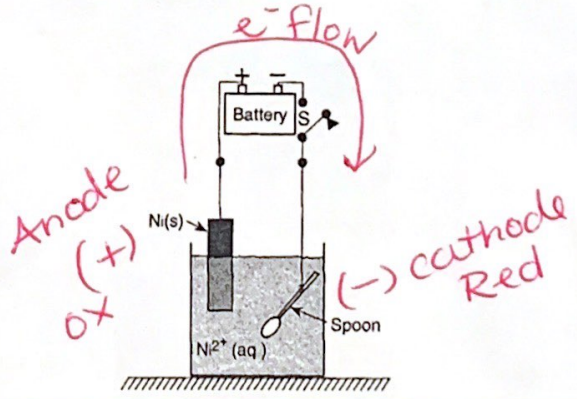
What is the total number of moles of electrons lost by 2 moles of Al(s)?

A) 1 mole
B) 6 moles
C) 3 moles
D) 9 moles

(B)

challenge!

____10. I can identify a redox reaction from a list of chemical reactions.	Which balanced equation represents a redox reaction? A) $AgNO_3(aq) + NaCl(aq) \rightarrow AgCl(s) + NaNO_3(aq)$ B) $H_2CO_3(aq) \rightarrow H_2O(\ell) + CO_2(g)$ C) $NaOH(aq) + HCl(aq) \rightarrow NaCl(aq) + H_2O(\ell)$ D) $Mg(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2(g)$ Which balanced equation represents a redox reaction? A) $PCl_5 \rightarrow PCl_3 + Cl_2$ B) $KOH + HCl \rightarrow KCl + H_2O$ C) $LiBr \rightarrow Li^+ + Br^-$ D) $Ca^{2+} + SO_4{}^{2-} \rightarrow CaSO_4$
____11. From a list of given list of elements, I can determine which element is most active.	Which of the following elements is most likely to react? A) Cu C) Li B) Al D) Mg
____12. I can state the two types of electrochemical cells.	The two types of electrochemical cells are: Voltaic (Electrochemical) and Electrolytic
____13. I can label the following on a voltaic cell: anode, cathode, site of oxidation, site of reduction, electron flow, positive electrode, negative electrode, salt bridge, voltmeter, aqueous solutions	

____14. I can state the purpose of the salt bridge in a voltaic cell.	**The purpose of the salt bridge is** keep cell neutral + allow ions to flow
____15. Given a voltaic (electrochemical) cell, I can predict the direction of electron flow.	The diagram below represents an electrochemical cell.  What occurs when the switch is closed? A) Zn is reduced. B) Cu is oxidized. C) Electrons flow from Cu to Zn. D) Electrons flow from Zn to Cu.
____16. I can explain, in terms of atoms and ions, the changes in mass that take place at the anode and cathode of a voltaic cell.	Explain, in terms of atoms and ions, why the mass of the cathode increases during the operation of a voltaic (electrochemical) cell. at the cathode ion change into atoms Explain, in terms of atoms and ions, why the mass of the anode decreases during the operation of a voltaic (electrochemical) cell. at the anode oxidation allows atoms to change into ions!
____17. I can label the following on a electrolytic cell: anode, cathode, site of oxidation, site of reduction, electron flow, positive electrode, negative electrode, battery, aqueous solution	
____18. I can explain the process of electroplating	**Given Ni (s) and Ni^{+2} (aq) ions, write out the oxidation and reduction half reactions that would occur when electroplating.** **Oxidation:** $Ni^0 \rightarrow Ni^{+2} + 2e^-$ (# ↑) **Reduction:** $Ni^{+2} + 2e^- \rightarrow Ni^0$ (# ↓)

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____19. I can compare the two types of electrochemical cells in terms of: number of containers, location of oxidation, location of reduction, direction of electron flow, conversion between electrical and chemical energy, and spontaneity of reaction.		Voltaic	Electrolytic
	Number of containers	2	1
	Oxidation occurs at the:	Anode	Anode
	Reduction occurs at the:	Cathode	Cathode
	Anode charge	−	+
	Cathode charge	+	−
	Electrons flow from	A → C	A → C
	Energy conversion that occurs in this cell	Chem → Electrical	Electrical → Chemical
	Is this reaction spontaneous or does it require an outside power source to happen?	Spontaneous	non Spontaneous