

1. Give the oxidation state of the following species:

- | | |
|--|--|
| <p>a. Calcium in Ca^{2+} _____</p> <p>b. Sulfur in S_8 _____</p> <p>c. Nitrogen in N_2O_4 _____</p> <p>d. Phosphorus in PCl_3 _____</p> <p>e. Lead in PbO_2 _____</p> | <p>f. Carbon in CH_3OH _____</p> <p>g. Vanadium in VO_3^- _____</p> <p>h. Bromine in BrO^- _____</p> <p>i. Chromium in $\text{Cr}_2\text{O}_7^{2-}$ _____</p> <p>j. Sulfur in $\text{S}_2\text{O}_3^{2-}$ _____</p> |
|--|--|

2. Identify the oxidant and the reductant in each of the following:

- | | <u>Oxidant</u> | <u>Reductant</u> |
|---|----------------|------------------|
| a. $\text{Mg} + \text{Zn}^{2+} \rightarrow \text{Mg}^{2+} + \text{Zn}$ | _____ | _____ |
| b. $\text{PbO} + \text{CO} \rightarrow \text{Pb} + \text{CO}_2$ | _____ | _____ |
| c. $2\text{CH}_3\text{OH} + 3\text{O}_2 \rightarrow 2\text{CO}_2 + 4\text{H}_2\text{O}$ | _____ | _____ |
| d. $\text{Fe} + \text{Cu}^{2+} \rightarrow \text{Fe}^{2+} + \text{Cu}$ | _____ | _____ |
| e. $2\text{Mg} + \text{SO}_2 \rightarrow 2\text{MgO} + \text{S}$ | _____ | _____ |

What is missing from all the above equations? _____

3. Metal displacement – TRUE OR FALSE:

- | | |
|--|-------|
| a. tin will displace lead metal from a solution of lead (II) nitrate | _____ |
| b. mercury will react with lead (II) nitrate solution | _____ |
| c. silver wire will react if dropped in copper sulfate solution | _____ |
| d. zinc metal decolourises copper nitrate solution | _____ |
| e. aluminium ions will displace iron metal | _____ |
| f. copper ions will displace silver ions | _____ |
| g. lead will be displaced by silver ions | _____ |

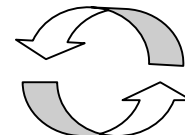
4. Find the oxidation state of the second element in each of the following *polyatomic* ions:

- | | | | |
|--------------------------|--|---|------------------------------------|
| a. KMnO_4 _____ | b. AlPO_4 _____ | c. NaCrO_4 _____ | d. KMn_2O_7 _____ |
| e. LiIO_4 _____ | f. $\text{Na}_2\text{S}_2\text{O}_3$ _____ | g. $\text{H}_2\text{C}_2\text{O}_4$ _____ | h. Na_2SiO_3 _____ |

5. Copper metal can be obtained in one process by letting copper (II) ions pass over scrap iron slowly.

a. Write the two half – equations involved (assume Fe^{2+} formed).

b. Indicate the reduction half – reaction.



1. Give the oxidation state of the following species:

- | | |
|--|--|
| a. Calcium in Ca^{2+} 2+ | f. Carbon in CH_3OH 2- |
| b. Sulfur in S_8 0 | g. Vanadium in VO_3^- 5+ |
| c. Nitrogen in N_2O_4 4+ | h. Bromine in BrO^- 1+ |
| d. Phosphorus in PCl_3 3+ | i. Chromium in $\text{Cr}_2\text{O}_7^{2-}$ 6+ |
| e. Lead in PbO_2 4+ | j. Sulfur in $\text{S}_2\text{O}_3^{2-}$ 2+ |

2. Identify the oxidant and the reductant in each of the following:

- | | oxidant | reductant |
|---|------------------|------------------------|
| a. $\text{Mg} + \text{Zn}^{2+} \rightarrow \text{Mg}^{2+} + \text{Zn}$ | Zn^{2+} | Mg |
| b. $\text{PbO} + \text{CO} \rightarrow \text{Pb} + \text{CO}_2$ | PbO | CO |
| c. $2\text{CH}_3\text{OH} + 3\text{O}_2 \rightarrow 2\text{CO}_2 + 4\text{H}_2\text{O}$ | O_2 | CH_3OH |
| d. $\text{Fe} + \text{Cu}^{2+} \rightarrow \text{Fe}^{2+} + \text{Cu}$ | Cu^{2+} | Fe |
| e. $2\text{Mg} + \text{SO}_2 \rightarrow 2\text{MgO} + \text{S}$ | SO_2 | Mg |
| What is missing from all the above equations? | state symbols | |

3. Metal displacement – TRUE OR FALSE:

- | | |
|--|---|
| a. tin will displace lead metal from a solution of lead (II) nitrate | T |
| b. mercury will react with lead (II) nitrate solution | F |
| c. silver wire will react if dropped in copper sulfate solution | F |
| d. zinc metal decolourises copper nitrate solution | T |
| e. aluminium ions will displace iron metal | F |
| f. copper ions will displace silver ions | F |
| g. lead will be displaced by silver ions | T |

4. Find the oxidation state of the second element in each of the following *polyatomic* ions:

- | | | | |
|-----------------------|---|--|---|
| a. KMnO_4 7+ | b. AlPO_4 5+ | c. NaCrO_4 7+ | d. $\text{K}_2\text{Mn}_2\text{O}_7$ 6+ |
| e. LiIO_4 7+ | f. $\text{Na}_2\text{S}_2\text{O}_3$ 2+ | g. $\text{H}_2\text{C}_2\text{O}_4$ 3+ | h. Na_2SiO_3 4+ |

5. Copper metal can be obtained in one process by letting copper (II) ions pass over scrap iron slowly.

a. Write the two half – equations involved (assume Fe^{2+} formed).



b. Indicate the reduction half – reaction. $\text{Cu}^{2+}_{(aq)} + 2e^- \rightarrow \text{Cu}$