

Chapter 19 Worksheet 1 (oxidation numbers and balancing)

Name:

UGA ID:

Instructions:

- Please enter your first and last name as it appears on the eLC roster (do not use a nickname).
- Your UGA myID is a combination of letters and numbers (example: mine is wpe28548). **Do not use your 81x number.**
- If you do not have a printer, type your answers in the then upload the worksheet template to Gradescope by Wednesday, April 28 at 11:59 p.m. Write your work on separate sheets of paper, convert to a PDF and upload to eLC.
- If you have a printer download the worksheet, convert it to a PDF and upload to Gradescope by Wednesday, April 28 at 11:59 p.m. You do not need to upload anything to eLC.

1.

A. Determine the oxidation state of nitrogen in nitrogen gas.

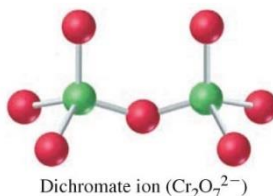
B. Determine the oxidation state of chlorine in the perchlorate ion.

C. Determine the oxidation state of oxygen in hydrogen peroxide.

D. Determine the oxidation state of arsenic in sodium arsenate.

2. What is the oxidation state of Cr in $\text{Cr}_2\text{O}_7^{2-}$?

- A. +8
- B. +7
- C. +6
- D. -1
- E. -2

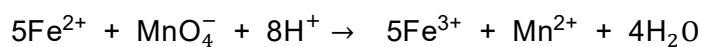


3.

A. What is the oxidation state of phosphorus in phosphoric acid?

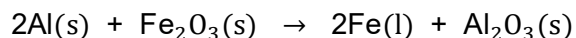
B. What is the oxidation state of sulfur in the sulfite ion?

4. Which of the statements below is true about the following redox reaction occurring in aqueous solution.



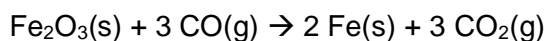
- A. MnO_4^- is being oxidized to Mn^{2+}
- B. Mn in MnO_4^- undergoes a change in oxidation state from -1 to +2.
- C. O in MnO_4^- undergoes a change in oxidation state from -1 to -2.
- D. H does not change its oxidation state.
- E. Fe does not change its oxidation state.

5. Which of the following statements is false about the thermite reaction?



- A. The chemical equation given above is balanced.
- B. The oxidation state of Fe in Fe_2O_3 is +3.
- C. The oxidation state of Al in Al_2O_3 is +2.
- D. Fe in Fe_2O_3 is reduced to elemental iron.
- E. The oxidation state of O remains unchanged.

6. A. What species is reduced in the reaction of iron(III) oxide with carbon monoxide to produce iron metal and carbon dioxide?

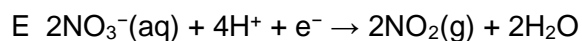
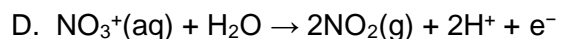
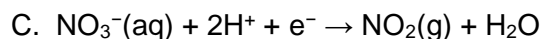
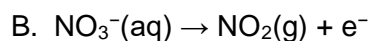


- A. Fe_2O_3
- B. CO
- C. Fe
- D. CO_2
- E. C
- F. O

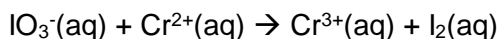
B. What species is the oxidizing agent

- A. Fe_2O_3
- B. CO
- C. Fe
- D. CO_2
- E. C
- F. O

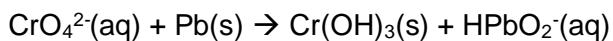
7. In the presence of **acid**, nitrate ion (NO_3^-) oxidizes solid copper to Cu^{2+} . The by-product is gaseous NO_2 (brown). The balanced half reaction for NO_3^- reacting to form NO_2 is



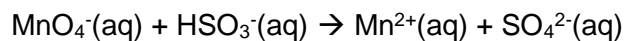
8. Balance the following reaction in **acidic** solution. Enter the coefficients for iodate ion and Cr(II) with the numbers separated by a comma and no spaces.



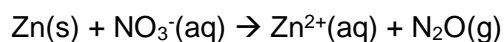
9. Balance the following reaction in **basic** solution. Enter the coefficients for the chromate ion and Pb separated by a comma and no spaces.



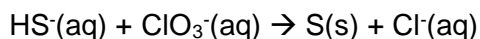
10. Balance redox equation that occurs in **acidic** solution. Enter the coefficient for MnO_4^- .



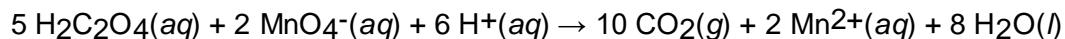
11. Balance the redox equation that occurs in **acidic** solution. Enter the coefficient for Zn.



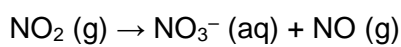
12. Balance the redox equation that occurs in **basic** solution. Enter the coefficient for HS^- .



13. According to the balanced equation shown below, 1.00 mole of oxalic acid, $\text{H}_2\text{C}_2\text{O}_4$, reacts with _____ moles of permanganate ion, MnO_4^- .



14. A disproportionation reaction is one in which identical species react. Balance this redox reaction for this self-reaction of nitrogen dioxide in acidic solution to form nitrogen compounds of both lower and higher oxidation states. Provide the sum of the coefficients in the balanced equation.



15. Calculate K_{sp} for PbI_2 at 25 °C based on the following data:

Species	ΔG°_f , kJ/mol
$\text{Pb}^{2+} (\text{aq})$	-24.4
$\text{I}^- (\text{aq})$	-51.6
$\text{PbI}_2 (\text{s})$	-173.6

16. Consider the reaction of 25.0 mL of 0.20 M $\text{AgNO}_3(\text{aq})$ with 25.0 mL of 0.20 M $\text{NaBr}(\text{aq})$ to form $\text{AgBr}(\text{s})$ at 25 °C. What is ΔG for this reaction? The K_{sp} of AgBr is 5.0×10^{-13} at 25 °C.