Name:	

manganese (II) oxide

AP Chemistry

Balancing Redox Reactions

1. Determine the oxidation state of each of the elements in the following:

PO ₄ -3 PO ₃ -3	HPO4 ⁻¹	$H_2PO_4^{-2}$	CH4

2. For each of the following, assign oxidation numbers then label which element is oxidized and which is reduced.

 $2 \operatorname{Fe}(s) + 3 \operatorname{Cl}_2(g) \rightarrow 2 \operatorname{FeCl}_3(s)$ $2 \operatorname{C}_2 \operatorname{H}_2(g) + 5 \operatorname{O}_2(g) \rightarrow 4 \operatorname{CO}_2(g) + 2 \operatorname{H}_2 \operatorname{O}(l)$ $5 \operatorname{CO}(g) + \operatorname{I}_2 \operatorname{O}_5(g) \rightarrow \operatorname{I}_2(l) + 5 \operatorname{CO}_2(g)$

potassium permanganate

Balance the following two reactions in acid

3. $\operatorname{Cr}_2\operatorname{O}_7^{-2}(\operatorname{aq}) + \operatorname{I}^{-1}(\operatorname{aq}) \rightarrow \operatorname{Cr}^{+3}(\operatorname{aq}) + \operatorname{I}_2(\operatorname{I})$

4.
$$\operatorname{Mn}^{2+}(\operatorname{aq}) + \operatorname{BiO}_3^{-1}(\operatorname{aq}) \rightarrow \operatorname{MnO}_4^{-1}(\operatorname{aq}) + \operatorname{Bi}^{+3}(\operatorname{aq})$$

Balance the following two reactions in base

5.
$$MnO_4^{-1}(aq) + C_2O_4^{-2}(aq) \rightarrow MnO_2(s) + CO_3^{-2}(aq)$$

6.
$$BH_4^{-1}(aq) + ClO_3^{-1}(aq) \rightarrow H_2BO_3^{-1}(aq) + Cl^{-1}(aq)$$

7. Potassium dichromate is a bright orange compound that can be reduced to a blue violet solution of Cr^{+3} ions. Under certain conditions potassium dichromate reacts with ethyl alcohol (C₂H₅OH) according to the equation below. Identify the atoms that are oxidized and those that are reduced.

$$H^+(aq) + Cr_2O_7^{-2}(aq) + C_2H_5OH(l) \rightarrow Cr^{+3}(aq) + CO_2(g) + H_2O(l)$$

8. Balance the equation for the reaction between permanganate and bromide ions in acidic solution.

$$Br^{-}(aq) + Cr_2O_7^{-2}(aq) \rightarrow Br_2(aq) + CrO_2(s)$$

9. Balance the following oxidation-reduction reaction that occurs in basic solution

$$Pb(s) + MnO_4^{-1}(aq) \rightarrow PbO_2(aq) + MnO_2$$