

**Honors Chemistry: Chemical Reactions Podcasts 7-9 Problem Set- Redox Reactions**

1). What is the oxidation number for each element in  $\text{KMnO}_4$ ?

2). What is the oxidation number for Cr in  $\text{Cr}_2\text{O}_7^{2-}$ ?

3). What is the oxidation number for C in  $\text{CO}_2$ ?

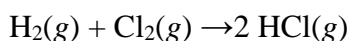
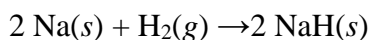
4). What is the oxidation number for C in  $\text{CH}_4$ ?

5). Identify the following as either oxidizing or reducing agents and briefly justify your choice.

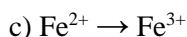
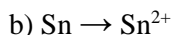
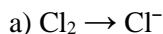
$\text{Cu}$ ,  $\text{HF}$ ,  $\text{O}_2$ ,  $\text{Pb}$ ,  $\text{Na}^+$ ,  $\text{Br}_2$ ,  $\text{H}_2\text{O}_2$ ,  $\text{MnO}_4$

Rules for Oxidation Numbers	Examples
Atoms in elemental form = 0	Na, $\text{O}_2$ , As, $\text{N}_2$ , Mg
Monatomic ions = the ion's charge	$\text{K}^+$ , $\text{Ca}^{2+}$ , $\text{Fe}^{3+}$ , $\text{S}^{2-}$ , $\text{Al}^{3+}$
Oxygen = -2 except in peroxides = -1	$\text{CaO}$ (O = -2); $\text{Na}_2\text{O}_2$ (O = -1)
Hydrogen = +1 except metal hydrides = -1	$\text{HCl}$ (H = +1); $\text{LiH}$ (H = -1)
Oxidation states in compounds must sum to zero.	$\text{FeCl}_2$ , $\text{FeCl}_3$ contain $\text{Fe}^{2+}$ and $\text{Fe}^{3+}$
Oxidation states in polyatomic ions must sum to the ion charge.	$\text{ClO}_4^-$ , $\text{ClO}_3^-$ chlorine = +7 and +5
Assign the more electronegative element a negative oxidation number.	$\text{PF}_5$ contains F = -1 and P = +5

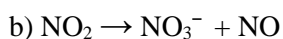
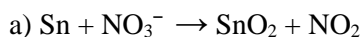
6). Identify hydrogen gas as either an oxidizing agent or a reducing agent in each reaction below. Justify your response.



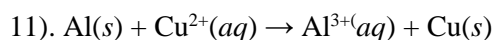
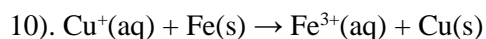
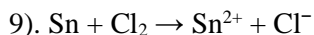
7). Balance each half-reaction for atoms and charge:



8). Separate each of these redox reactions into their two half-reactions (but do not balance):



*For the following questions separate each into half-reactions, balance, and recombine.*



*Use the net ionic method to balance the following redox reaction:*

12). Solid magnesium is mixed with aqueous aluminum phosphate.