

## 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  $\text{CO}_2$ ?

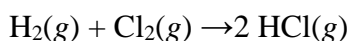
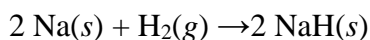
4). What is the oxidation number for C in  $\text{CH}_4$ ?

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

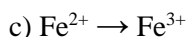
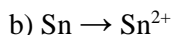
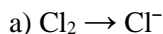
$\text{Cu}$ ,  $\text{F}_2$ ,  $\text{O}_2$ ,  $\text{Pb}$ ,  $\text{HNO}_3$ ,  $\text{Na}^+$ ,  $\text{Br}_2$ ,  $\text{H}_2\text{O}_2$ ,  $\text{MnO}_4$

Rules for Oxidation Numbers	Examples
Atoms in elemental form = 0	Na, O <sub>2</sub> , As, N <sub>2</sub> , Mg
Monatomic ions = the ion's charge	K <sup>+</sup> , Ca <sup>2+</sup> , Fe <sup>3+</sup> , S <sup>2-</sup> , Al <sup>3+</sup>
Oxygen = -2 except in peroxides = -1	CaO (O = -2); Na <sub>2</sub> O <sub>2</sub> (O = -1)
Hydrogen = +1 except metal hydrides = -1	HCl (H = +1); LiH (H = -1)
Oxidation states in compounds must sum to zero.	FeCl <sub>2</sub> , FeCl <sub>3</sub> contain Fe <sup>2+</sup> and Fe <sup>3+</sup>
Oxidation states in polyatomic ions must sum to the ion charge.	ClO <sub>4</sub> <sup>-</sup> , ClO <sub>3</sub> <sup>-</sup> chlorine = +7 and +5
Assign the more electronegative element a negative oxidation number.	PF <sub>5</sub> contains F = -1 and P = +5

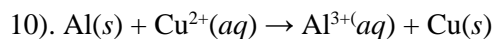
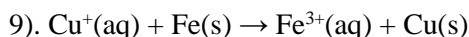
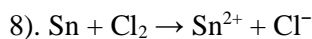
6). Identify hydrogen gas as either an oxidizing agent or a reducing agent in each reaction below. Justify your response.



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



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



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

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