4.45

	oxidation	reduction
electron transfer	electrons lost	electrons gained
oxidation number	oxidation number increases	oxidation number decrease (reduced)

4.47 Oxidation refers to the losing of electrons. As such, this question is asking us to determine with atoms lose electrons most readily. We know that group I and II metals (A) are large and weak, meaning they have low ionization energies. As such, they are the most readily oxidized. Conversely, non-metals (D) are compact, high ionization energy atoms, meaning they are least readily oxidized.

4.49 a) $\underline{S}^{(+4)}O_2^{(-2)}$

b) $\underline{C}^{(+4)}O^{(-2)}Cl_2^{(-1)}$

c) $K^{(1+)}\underline{Mn}^{(+7)}O_4^{(-2)}$

d) $H^{(1+)}\underline{Br}^{(+1)}O^{(-2)}$

e) $\underline{As}_4^{(0)}$

f) $K_2^{(+1)}\underline{O}_2^{(-1)}$

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a) $N_2^{(0)} + 3H_2^{(0)} \Rightarrow 2N^{(-3)}H_3^{(+1)}$

nitrogen is reduced, hydrogen is oxidized

b) $3Fe^{(2+)}(N^{(+5)}O_3^{(-2)})_2 + 2Al^{(0)} \Rightarrow 3Fe^{(0)} + 2Al^{(3+)}(N^{(+5)}O_3^{(-2)})_3$

Fe^{2+} is reduced, aluminum is oxidized

c) $Cl_2^{(0)} + 2Na^{(+1)}I^{(-1)} \Rightarrow I_2^{(0)} + 2Na^{(+1)}Cl^{(-1)}$

chlorine gas is reduced, iodide ion is oxidized

d) $Pb^{(2+)}S^{(-2)} + 4H_2^{(+1)}O_2^{(-1)} \Rightarrow Pb^{(+2)}S^{(+6)}O_4^{(-2)} + 4H_2^{(+1)}O^{(-2)}$

oxygen is reduced, sulfur is oxidized

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$Sn + 2HCl \Rightarrow SnCl_2 + H_2$

$Sn + 2H^+ \Rightarrow Sn^{2+} + H_2$

4.53

$2Al + 6HCOOH \Rightarrow 2Al(HCOO)_3 + 3H_2$

$2Al + 6HCOOH \Rightarrow 2Al^{3+} + 6HCOO^- + 3H_2$

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c) $Sn + 2HCl \Rightarrow SnCl_2 + H_2$

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d) $2Al + 6HCOOH \Rightarrow 2Al(HCOO)_3 + 3H_2$

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