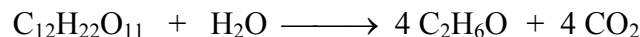


## ConceptTest On Simple Redox Reactions

*ConceptTest designed to test oxidation numbers and their use:*

The chemical reaction which occurs when sucrose ( $C_{12}H_{22}O_{11}$ ) ferments to ethanol ( $C_2H_6O$ ) is



In this reaction, the oxidation number of the carbon

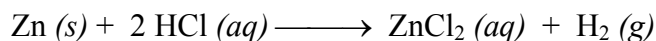
1. changes from 0 in  $C_{12}H_{22}O_{11}$  to  $-2$  in  $C_2H_6O$ , so the carbon is oxidized.
2. changes from 0 in  $C_{12}H_{22}O_{11}$  to  $+2$  in  $C_2H_6O$ , so the carbon is reduced.
3. changes from 0 in  $C_{12}H_{22}O_{11}$  to  $-2$  in  $C_2H_6O$ , so the carbon is reduced.
4. is unchanged, so this is not a redox reaction.

*Correct Answer is #3.*

*Comment to Instructor: Students need to be able to correctly assign oxidation numbers, and to apply the results to the interpretation of what's going on.*

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### **ConceptTest on oxidation numbers**



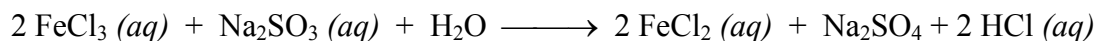
In the reaction shown above, what is the oxidation number of  $H_2$  ?

1.  $+1$
2.  $-1$
3.  $0$
4.  $+2$

*Comment to Instructor: Correct answer is #3. 0. Student selecting #1 mistakenly thinks all hydrogen exist as  $H^+$ . Student selecting #4 probably thinks the subscript 2 in  $H_2$  is the oxidation number.*

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### **ConceptTest on Oxidation Numbers**



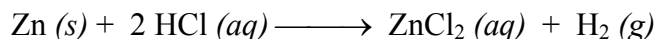
In the reaction shown above, which element is undergoing oxidation?

1. Fe
2. Cl
3. S
4. O

*Comment to Instructor: Correct answer is #3. S. It has an oxidation number of  $+4$  in  $Na_2SO_3$  and an oxidation number of  $+6$  in  $Na_2SO_4$ .*

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### **ConceptTest on Oxidation vs. Reduction**



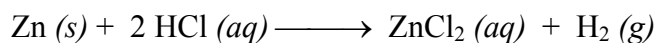
In the reaction shown above, is Zn being oxidized or reduced?

1. oxidized
2. reduced
3. neither

*Comment to Instructor: Correct answer is 1. oxidized. The oxidation number of Zn is changing from 0 to +2.*

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### **ConceptTest on Oxidation vs. Reduction**



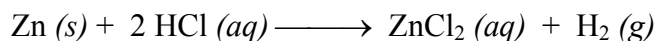
In the reaction shown above, is Cl being oxidized or reduced?

1. oxidized
2. reduced
3. neither

*Comment to Instructor: Correct answer is 3. neither. The oxidation number of Cl is -1 in HCl as well as in ZnCl<sub>2</sub>. Some students make think the Cl is changing from +1 to +2 or -1 to -2 because the subscript of Cl changed.*

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### **ConceptTest on Identifying Which is the Oxidizing Agent**



In the reaction shown above, which is the oxidizing agent?

1. Zn
2. H
3. HCl
4. Zn<sup>+2</sup>

*Comment to Instructor: Correct answer is 3. HCl. Since the oxidation number of H is decreasing from +1 to 0, it is undergoing reduction. Zn is being oxidized, and HCl is the "agent" that is causing the Zn to be oxidized. #4 indicates that the student is thinking that the Zn<sup>+2</sup> in ZnCl<sub>2</sub> is undergoing reduction and is therefore the oxidizing agent. It is common for students to look at the products to find the oxidizing agent.*

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