Definitions: Oxidation Reduction

1. Scientific processes are often defined **operationally** and / or **theoretically.**

Consider the statements below:

|  |  |
| --- | --- |
| 1 | A chemical reaction between oxygen and some other substance |
| 2 | A chemical reaction that allows electrons to be gained |
| 3 | A chemical reaction where a metal is extracted from an ore |
| 4 | A chemical reaction that allows electrons to be lost |

The operational definition of oxidation is given in statement \_\_\_\_ while the theoretical definition of reduction is given in statement \_\_\_\_\_\_\_

|  |  |  |
| --- | --- | --- |
| a | 3 | 4 |
| b | 3 | 2 |
| c | 1 | 3 |
| d | 1 | 2 |

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The operational definition of reduction is given in statement \_\_\_\_ while the theoretical definition of reduction is given in statement \_\_\_\_\_\_\_

|  |  |  |
| --- | --- | --- |
| a | 3 | 2 |
| b | 1 | 4 |
| c | 2 | 3 |
| d | 4 | 1 |

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The theoretical definition of oxidation is given in statement \_\_\_\_ while the operational definition of reduction is given in statement \_\_\_\_\_\_\_

|  |  |  |
| --- | --- | --- |
| a | 2 | 1 |
| b | 4 | 3 |
| c | 2 | 3 |
| d | 4 | 1 |

1. Reducing agents are \_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | Usually positively charged |
| b | Able to spontaneously react with Li(s) |
| c | Able to lose electrons |
| d | Easily reduced |

1. Reduction potentials are a measure of the tendency of a(n) \_\_\_\_\_\_\_ agent to \_\_\_\_ electrons.

|  |  |  |
| --- | --- | --- |
| a | Reducing | Lose |
| b | Reducing | Gain |
| c | Oxidizing | Lose |
| d | Oxidizing | Gain |

1. Oxidation potentials are a measure of the tendency of a(n) \_\_\_\_\_\_\_ agent to \_\_\_\_ electrons.

|  |  |  |
| --- | --- | --- |
| a | Reducing | Lose |
| b | Reducing | Gain |
| c | Oxidizing | Lose |
| d | Oxidizing | Gain |

1. Which statement is true of a substance with an **oxidation potential** of 2.52 V?

|  |  |
| --- | --- |
| a | It is a weak reducing agent |
| b | It is a strong reducing agent |
| c | It is a strong oxidizing agent. |
| d | It is a reagent capable of disproportionation. |

1. Reduction is indicated by a

|  |  |
| --- | --- |
| a | loss of electrons |
| b | decrease in oxidation number |
| c | positive ion becoming more positively charged |
| d | negative ion becoming neutrally charged |

1. An electrolytic cell is one in which the\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | net potential of the reaction is positive |
| b | oxidation-reduction reaction is spontaneous |
| c | energy is converted from electrical to chemical |
| d | energy is converted from chemical to electrical |

1. Up to 25% of the yearly production of iron is used to replace iron objects that must be discarded because of corrosion. The corrosion of iron is caused mainly by \_\_\_\_\_\_

|  |  |
| --- | --- |
| a | an electrolytic process |
| b | A Voltaic process |
| c | a reaction between iron and air only |
| d | an endothermic neutralization process |

1. A substance that loses electrons is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | found at the cathode |
| b | the oxidizing agent |
| c | undergoing reduction |
| d | undergoing oxidation |

1. When a substance undergoes oxidation, it always \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | Loses electrons |
| b | Decreases its oxidation number |
| c | Becomes positively charged |
| d | Attains a charge of zero |

1. **Numerical response question:** Left justify your answer in the boxes provided.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| Consider the four statements listed below   |  |  | | --- | --- | | 1 | Gold ions gain 3 e- to become Au(s) | | 2 | Zinc forms zinc ions by losing 2e- | | 3 | The oxidation number of nickel changes from 0 to 2+ | | 4 | The oxidation number of chromium changes from 6+ to 3+ |   Choose all the statements that apply to an oxidation reaction.  List the number(s) in ascending order | | | | | | |
|  | | | | | |
|  | | | | | |

1. **Numerical response question:** Left justify your answer in the boxes provided.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| Consider the numbered statements below:   |  |  | | --- | --- | | 1 | Cr3+ forms Cr2+ | | 2 | A piece of iron metal rusts | | 3 | Chloride ions are converted to chlorine molecules | | 4 | Magnesium atoms are converted to magnesium ions | | 5 | Zinc ions gain electrons | | 6 | Oxidation number of lead goes from +4 to +2 |   List all the statements above that describe an oxidation reaction.  List the answer(s) in ascending order. | | | | | |

Solutions:

1. D
2. A
3. B
4. C
5. D
6. A
7. B
8. B
9. C
10. B
11. D
12. A
13. 23
14. 156