

Assigning Oxidation Numbers Worksheet

WORKSHEET – ASSIGNING OXIDATION NUMBERS

Name _____

Period _____

Oxidation Number Rules:

1. A pure element has an oxidation number of 0.
2. The oxidation number of an element in a monatomic ion equals the charge of the ion.
3. The sum of the oxidation number of all the elements in a compound equals 0.
4. The sum of the oxidation numbers of all the elements in a polyatomic ion equals the charge on the ion.

Directions: In the following questions, give the oxidation number of the indicated atoms/ion.

- | | |
|--|--|
| 1. N in N_2O_3 N^{+3} | 16. C in CH_4 C^{-4} |
| 2. S in H_2SO_4 S^{+6} | 17. Mn in MnO_2 Mn^{+4} |
| 3. C C^0 | 18. S in SO_3^{2-} S^{+4} |
| 4. C in CO C^{+2} | 19. Mg^{2+} Mg^{+2} |
| 5. Na in NaCl Na^{+1} | 20. Cl^- Cl^{-1} |
| 6. H in H_2O H^{+1} | 21. O_2 O_2^0 |
| 7. Ba in BaCl_2 Ba^{+2} | 22. P_4 P_4^0 |
| 8. N in NO_2^- N^{+3} | 23. Na in Na_2S Na^{+1} |
| 9. S in Al_2S_3 S^{-2} | 24. S in H_2S S^{-2} |
| 10. S in HSO_4^- S^{+6} | 25. Ca^{2+} Ca^{+2} |
| 11. Cl in $\text{Fe}(\text{ClO}_2)_3$ Cl^{+3} | 26. C in CN $^-$ C^{+2} |
| 12. Fe in $\text{Fe}(\text{ClO}_2)_3$ Fe^{+3} | 27. H in OH^- H^{+1} |
| 13. N in NO_3^- N^{+5} | 28. Mn in KMnO_4 Mn^{+7} |
| 14. Cu^{2+} Cu^{+2} | 29. I in $\text{Mg}(\text{IO}_3)_2$ I^{+5} |
| 15. Zn^{2+} Zn^{+2} | 30. C in $\text{C}_2\text{O}_4^{2-}$ C^{+3} |

Mastering the Art of Assigning Oxidation Numbers: A Comprehensive Worksheet Guide

Are you struggling to assign oxidation numbers? Feeling overwhelmed by the rules and exceptions? You've come to the right place! This comprehensive guide provides a step-by-step approach to mastering oxidation numbers, complete with a downloadable worksheet to solidify your understanding. We'll break down the process, cover common pitfalls, and equip you with the tools you need to confidently tackle any oxidation number assignment. Let's dive in!

Understanding Oxidation Numbers: The Basics

Before we tackle the worksheet, let's review the fundamentals. Oxidation numbers, also known as oxidation states, represent the hypothetical charge an atom would have if all bonds were completely ionic. They are crucial for balancing redox reactions and understanding chemical processes. Remember, oxidation numbers are assigned, not measured; they are a bookkeeping tool to track electron transfer.

Key Rules for Assigning Oxidation Numbers:

Rule 1: The oxidation number of an element in its free (uncombined) state is always 0. Examples: O_2 (oxygen gas), Na (sodium metal), Fe (iron).

Rule 2: The oxidation number of a monatomic ion is equal to its charge. Examples: Na^+ (+1), Cl^- (-1), Mg^{2+} (+2).

Rule 3: The oxidation number of hydrogen is usually +1, except in metal hydrides where it is -1. Examples: HCl (+1), NaH (-1).

Rule 4: The oxidation number of oxygen is usually -2, except in peroxides (like H_2O_2) where it is -1 and in superoxides where it is -1/2. This is a common exception, so pay close attention!

Rule 5: The oxidation number of a group 1 (alkali metal) element is always +1.

Rule 6: The oxidation number of a group 2 (alkaline earth metal) element is always +2.

Rule 7: The sum of the oxidation numbers of all atoms in a neutral molecule is 0.

Rule 8: The sum of the oxidation numbers of all atoms in a polyatomic ion is equal to the charge of the ion.

Working Through an Assigning Oxidation Numbers Worksheet: Examples

Let's apply these rules with some practical examples. Consider the compound H_2SO_4 (sulfuric acid).

- Hydrogen (H): According to Rule 3, each hydrogen atom has an oxidation number of +1. There are two hydrogen atoms, contributing a total of +2.
- Oxygen (O): According to Rule 4, each oxygen atom has an oxidation number of -2. There are four oxygen atoms, contributing a total of -8.
- Sulfur (S): Let 'x' represent the oxidation number of sulfur. Since the molecule is neutral (Rule 7), the sum of oxidation numbers must be 0. Therefore, we have: $(+2) + x + (-8) = 0$. Solving for x, we find that the oxidation number of sulfur is +6.

Now, let's try a polyatomic ion, like SO_4^{2-} (sulfate ion).

1. Oxygen (O): Each oxygen has an oxidation number of -2 (Rule 4), totaling -8.
2. Sulfur (S): Let 'x' represent the oxidation number of sulfur. The sum of oxidation numbers must equal the charge of the ion (Rule 8). Therefore: $x + (-8) = -2$. Solving for x, we get an oxidation number of +6 for sulfur.

Common Mistakes to Avoid When Assigning Oxidation Numbers

Forgetting Exceptions: Remember the exceptions to the rules, especially for oxygen and hydrogen.

Incorrectly Applying Rules: Ensure you apply the correct rule for each element based on its position and bonding within the molecule or ion.

Mathematical Errors: Double-check your calculations to avoid simple arithmetic mistakes.

Ignoring the Overall Charge: Remember to account for the charge of the ion when calculating oxidation numbers.

Downloadable Assigning Oxidation Numbers Worksheet

[Link to downloadable PDF worksheet here] (This would be replaced with an actual link to a downloadable worksheet in a real blog post)

The worksheet includes a variety of practice problems, ranging from simple molecules to more complex polyatomic ions. Working through these problems will solidify your understanding and build your confidence in assigning oxidation numbers.

Conclusion

Mastering the art of assigning oxidation numbers is essential for success in chemistry. By understanding the fundamental rules and practicing with the provided worksheet, you'll develop the skills needed to confidently tackle any oxidation number assignment. Remember to practice consistently, and don't hesitate to review the rules and examples as needed. Good luck!

FAQs

1. What happens if I get a fractional oxidation number? Fractional oxidation numbers are possible, particularly in compounds with resonance structures or complex bonding situations. They represent an average oxidation state.
2. Are there any online resources besides this worksheet to help me practice? Yes, many online chemistry websites and educational platforms offer interactive exercises and quizzes on assigning oxidation numbers.
3. How important are oxidation numbers for balancing redox reactions? Oxidation numbers are crucial for balancing redox reactions because they allow you to track the transfer of electrons between reactants.
4. Can I use this worksheet for high school or college-level chemistry? This worksheet is designed to be suitable for both high school and introductory college chemistry courses.
5. What if I'm still struggling after completing the worksheet? Review the rules again, focusing on the exceptions. Seek help from your teacher, professor, or a tutor if you need additional assistance.

assigning oxidation numbers worksheet: General Chemistry Workbook Daniel C. Tofan, 2010-07-28 This workbook is a comprehensive collection of solved exercises and problems typical to AP, introductory, and general chemistry courses, as well as blank worksheets containing further practice problems and questions. It contains a total of 197 learning objectives, grouped in 28 lessons, and covering the vast majority of the types of problems that a student will encounter in a typical one-year chemistry course. It also contains a fully solved, 50-question practice test, which gives students a good idea of what they might expect on an actual final exam covering the entire material.

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erster Linie als Lehrbuch gedacht, lässt sich das Werk aber auch hervorragend zum Selbststudium und zur Auffrischung des Wissensstandes verwenden. Lediglich elementare Grundkenntnisse der physikalischen Chemie werden vorausgesetzt.

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hands-on experience, AP chemistry courses include extensive labwork as part of the standard curriculum. This is why the book dedicates a chapter to providing a brief review of common laboratory equipment and techniques and another to a complete survey of recommended AP chemistry experiments. Two full-length practice exams help you build your confidence, get comfortable with test formats, identify your strengths and weaknesses, and focus your studies. You'll discover how to Create and follow a pretest plan Understand everything you must know about the exam Develop a multiple-choice strategy Figure out displacement, combustion, and acid-base reactions Get familiar with stoichiometry Describe patterns and predict properties Get a handle on organic chemistry nomenclature Know your way around laboratory concepts, tasks, equipment, and safety Analyze laboratory data Use practice exams to maximize your score Additionally, you'll have a chance to brush up on the math skills that will help you on the exam, learn the critical types of chemistry problems, and become familiar with the annoying exceptions to chemistry rules. Get your own copy of AP Chemistry For Dummies to build your confidence and test-taking know-how, so you can ace that exam!

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I want to change the existing organisation structure ; current system consist of one org structure , client needs to split the in to two Structure but the CEO it means reporting CEO of the ...

Curricula view in mobile app - SAP Community

Jun 14, 2023 · Hello! For all of you out there using the mobile app and assigning curricula to your users, you probably have noticed the app does not offer a curricula view. I have a feature ...

Appending a record to CT_ARRAY - SAP Community

I am trying to replicate one of my script logic into write back BAdI. The script logic reads the incoming record, changes one of the dimension and thus creates a new record. So, in ...

How to define Half day public holiday | SAP Community

We want to define half day public holiday (PH) on 24th dec and 31st dec. In this case we tried defining public holiday by putting 2 in holiday class and assigning it to holiday calendar and ...

Need assistance with assigning states to territory since update?

Hello. I am trying to do a realignment runs and assign states to a run associated with a territory. Using the State field and "INclude" I see the browse window which appears to give the ab

infosource problem - SAP Community

I am trying to create an infosource, but when i get to the tranfer rules screen [after assigning the datasource] all the fields are empty including the comm. structure. Can anyone please tell me ...

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