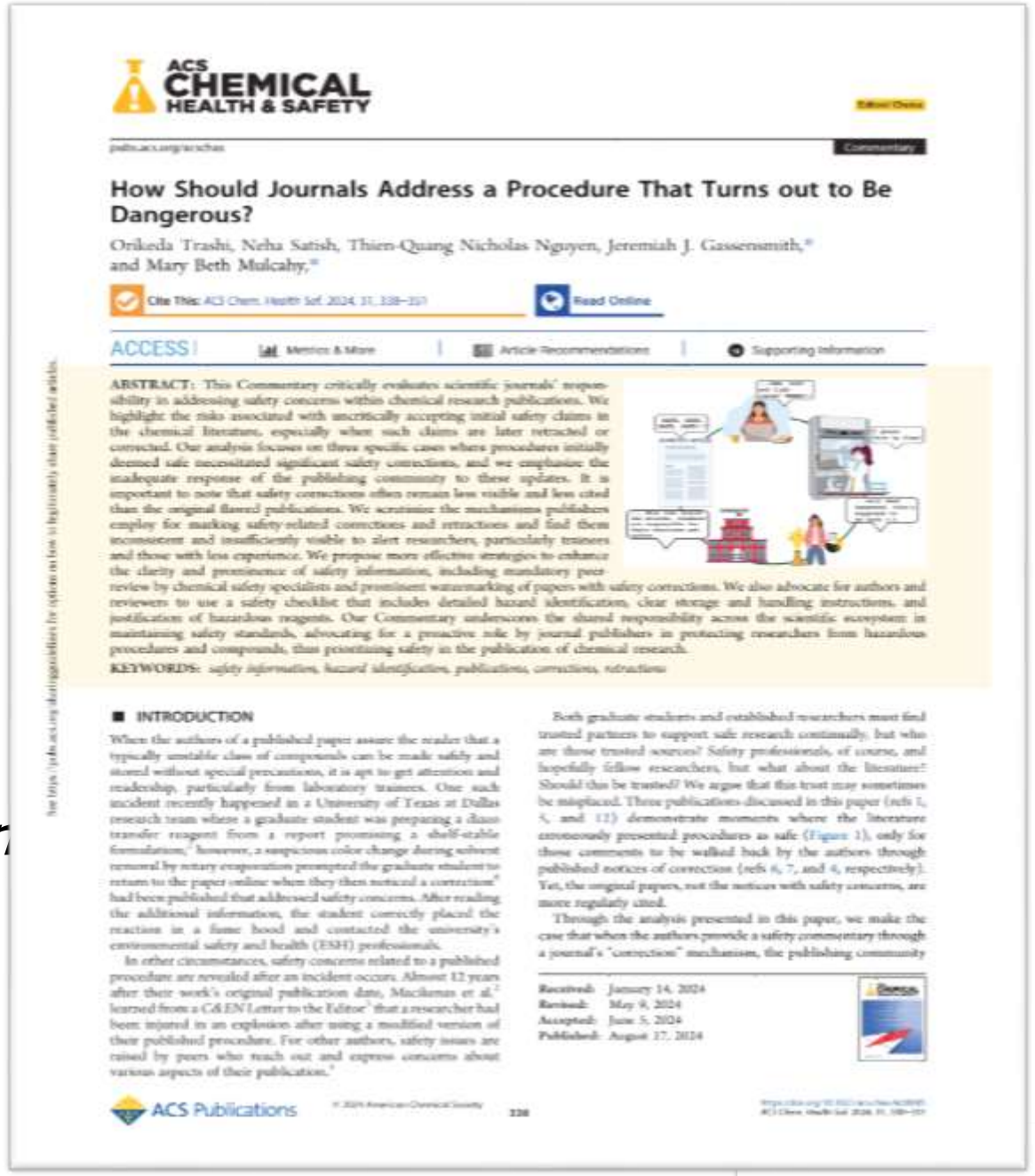
How Should Journals Address a Procedure That Turns out to Be Dangerous?

Mary Beth Mulcahy, PhD

(*Orikeda Trashi, Neha Satish, Thien Quang Nicholas Nguyen, Jeremiah J. Gassensmith*)



ACS CHEMICAL HEALTH & SAFETY

Commentary

How Should Journals Address a Procedure That Turns out to Be Dangerous?

Orikeda Trashi, Neha Satish, Thien-Quang Nicholas Nguyen, Jeremiah J. Gassensmith,* and Mary Beth Mulcahy,*

Cite This: ACS Chem. Health Saf. 2024, 31, 328−331 Read Online

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ABSTRACT: This Commentary critically evaluates scientific journals' responsibility in addressing safety concerns within chemical research publications. We highlight the risks associated with uncritically accepting initial safety claims in the chemical literature, especially where such claims are later retracted or corrected. Our analysis focuses on three specific cases where procedures initially deemed safe necessitated significant safety corrections, and we emphasize the inadequate response of the publishing community to these updates. It is important to note that safety corrections often remain less visible and less cited than the original flawed publications. We scrutinize the mechanisms publishers employ for marking safety-related corrections and retractions and find them inconsistent and insufficiently visible to alert researchers, particularly trainees and those with less experience. We propose more effective strategies to enhance the clarity and prominence of safety information, including mandatory peer review by chemical safety specialists and prominent watermarking of papers with safety corrections. We also advocate for authors and reviewers to use a safety checklist that includes detailed hazard identification, clear storage and handling instructions, and justification of hazardous reagents. Our Commentary underscores the shared responsibility across the scientific ecosystem in maintaining safety standards, advocating for a proactive role by journal publishers in protecting researchers from hazardous procedures and compounds, thus prioritizing safety in the publication of chemical research.

KEYWORDS: *safety information, hazard identification, publications, corrections, retractions*

■ INTRODUCTION

When the authors of a published paper assure the reader that a typically unstable class of compounds can be made safely and stored without special precautions, it is apt to get attention and readership, particularly from laboratory trainees. One such incident recently happened in a University of Texas at Dallas research team where a graduate student was preparing a diazo transfer reagent from a report promising a shelf-stable formulation;[1] however, a suspicious color change during solvent removal by rotary evaporation prompted the graduate student to return to the paper online where they then noticed a correction[2] had been published that addressed safety concerns. After reading the additional information, the student correctly placed the reaction in a fume hood and contacted the university's environmental safety and health (ESH) professionals.

In other circumstances, safety concerns related to a published procedure are revealed after an incident occurs. Almost 12 years after their work's original publication date, Mackman et al.[3] learned from a *C&EN* Letter to the Editor[4] that a researcher had been injured in an explosion after using a modified version of their published procedure. For other authors, safety issues are raised by peers who reach out and express concerns about various aspects of their publication.[5]

Both graduate students and established researchers must find trusted partners to support safe research continually, but who are those trusted sources? Safety professionals, of course, and hopefully fellow researchers, but what about the literature? Should this be trusted? We argue that this trust may sometimes be misplaced. Three publications discussed in this paper (refs 1, 3, and 12) demonstrate moments where the literature erroneously presented procedures as safe (Figure 1), only for those comments to be walked back by the authors through published notices of corrections (refs 6, 7, and 8, respectively). Yet, the original papers, not the notices with safety concerns, are more regularly cited.

Through the analysis presented in this paper, we make the case that when the authors provide a safety commentary through a journal's "correction" mechanism, the publishing community

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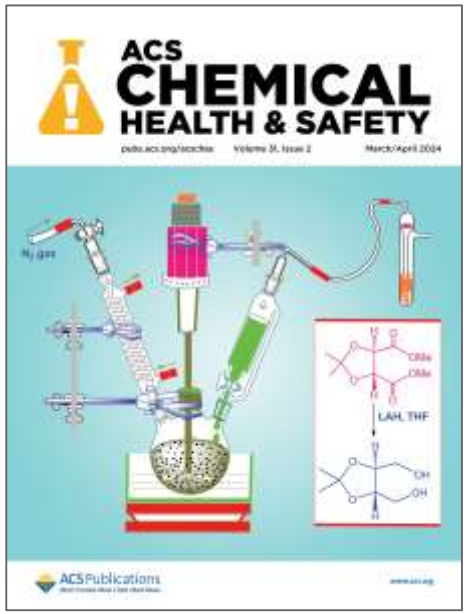
About the Journal



Audience: Scientists with broad research backgrounds (e.g. chemists, human factors, toxicology, occupational health), chemical engineers, environmental safety and health professionals, industrial hygienists, public health professionals, safety policy makers, graduate students, and more.

Scope: While safety permeates all ACS journals, it benefits from its preeminence in ACS CHAS. Chemical safety research can be transformational and innovative, and it can also focus on practice and be narrowly scoped. This includes foundational datasets or variations on well-studied themes because they hold value to those working with hazardous materials. ACS Chemical Health & Safety provides the opportunity to publish across all these areas.

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Topics & Impact


Machine Learning and Deep Learning in Chemical Health and Safety: A Systematic Review of Techniques and Applications

Zeren Jiao, Pingfan Hu, Hongfei Xu, and Qingsheng Wang*

Cite this: *ACS Chem. Health Saf.* 2020, 27, 6, 316−334

Publication Date: October 18, 2020

https://doi.org/10.1021/acs.chas.0c00075

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Article Views 21105 | Altmetric 12 | Citations 83

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Safe Synthesis of MAX and MXene: Guidelines to Reduce Risk During Synthesis

Christopher E. Shuck, Kimberly Ventura-Martinez, Adam Goad, Simge Uzun, Mikhail Shekhirev, and Yury Gogotsi*

Cite this: *ACS Chem. Health Saf.* 2021, 28, 5, 326−338

Publication Date: August 18, 2021

https://doi.org/10.1021/acs.chas.1c00051

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- Fundamental chemical safety research and datasets
- Chemical health safety and security warnings
- Chemical risk assessment and management for all settings (e.g., laboratory, industrial, educational, public spaces, etc.)
- Other (occupational safety, regulatory, emergency response, training/education, etc.)

ACS CHEMICAL HEALTH & SAFETY

Influencing chemical safety, guiding tomorrow's science

I'd like to pitch something to @JOC_OL . Put corrections that involve safety warnings on the downloadable PDF. You really can't warn people enough. Let's take this nice but "corrected" paper. Who wouldn't want an "intrinsically safe" diazo-transfer reagent?

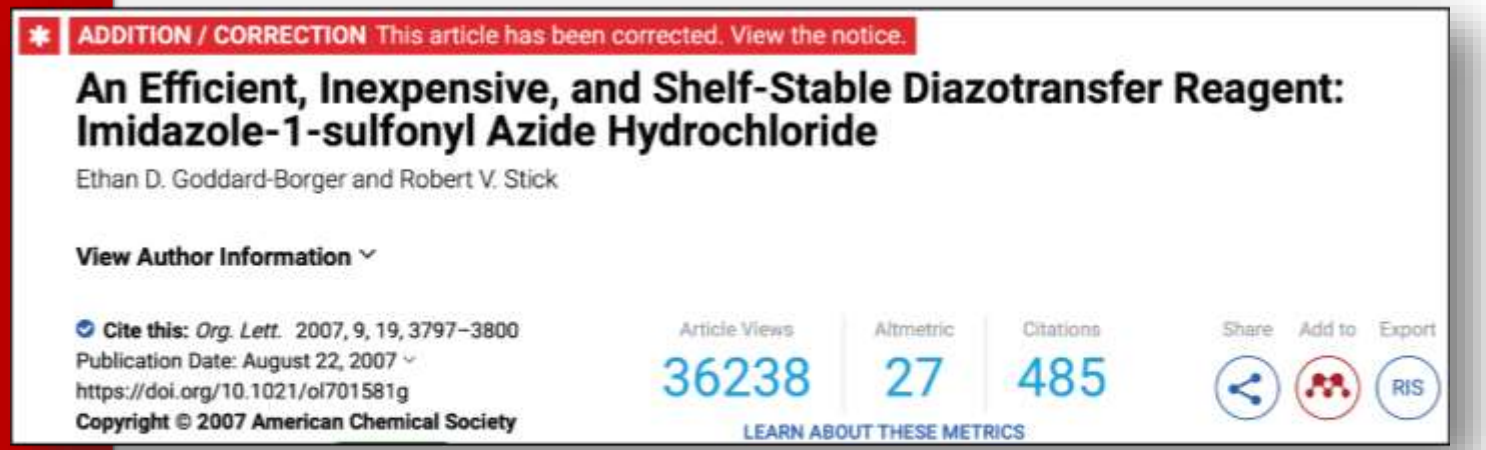
The problem is that this compound turns out to be explosive as a solid and the authors have corrected that [...]
The compound clearly isn't "intrinsically safe" and considering it explodes the downloadable PDF should be marked.

Again, here's another "stable" and non-explodey diazotranfer reagent: (spoiler: it also explodes as a solid)

Again, a correction—the title compound explodes. [...] and again, the PDF doesn't mention it.

Here's my pitch—Yes, the website shows a correction, though it doesn't specify that it is safety related. If the consequence of not seeing that correction is blowing a few fingers off then that notice needs to be plastered everywhere *including and especially* the downloaded PDF

Three articles in ACS journals that published follow-up safety corrections.



ADDITION / CORRECTION This article has been corrected. View the notice.

An Efficient, Inexpensive, and Shelf-Stable Diazotransfer Reagent: Imidazole-1-sulfonyl Azide Hydrochloride

Ethan D. Goddard-Borger and Robert V. Stick

View Author Information

Cite this: *Org. Lett.* 2007, 9, 19, 3797–3800
Publication Date: August 22, 2007
https://doi.org/10.1021/ol701581g
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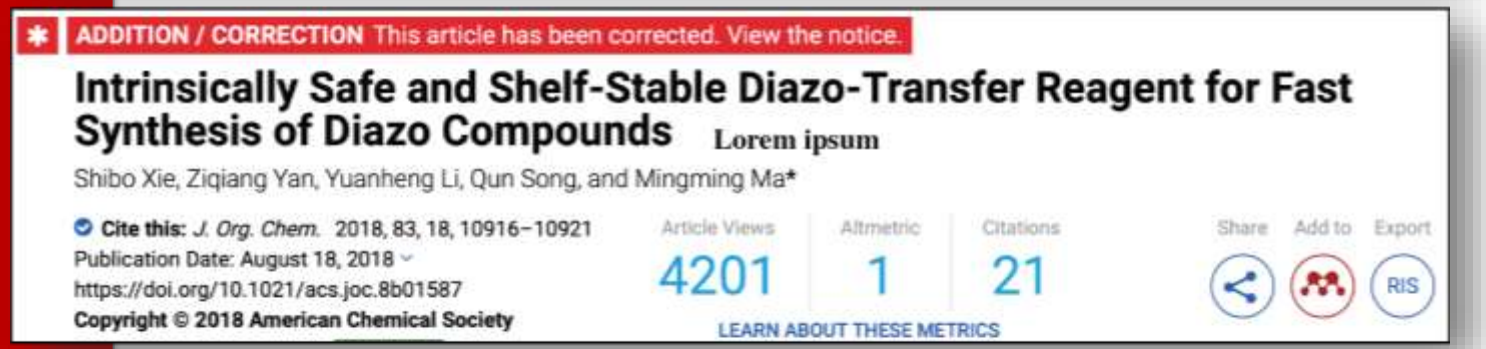

ADDITION / CORRECTION This article has been corrected. View the notice.

Intrinsically Safe and Shelf-Stable Diazo-Transfer Reagent for Fast Synthesis of Diazo Compounds Lorem ipsum

Shibo Xie, Ziqiang Yan, Yuanheng Li, Qun Song, and Mingming Ma*

Cite this: *J. Org. Chem.* 2018, 83, 18, 10916–10921
Publication Date: August 18, 2018
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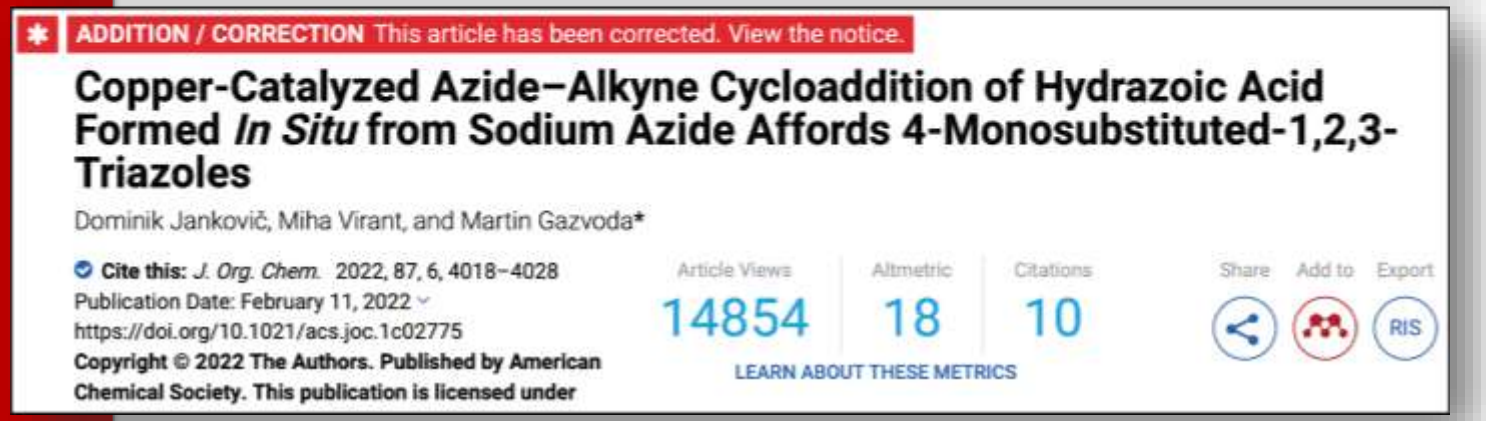

ADDITION / CORRECTION This article has been corrected. View the notice.

Copper-Catalyzed Azide–Alkyne Cycloaddition of Hydrazoic Acid Formed *In Situ* from Sodium Azide Affords 4-Monosubstituted-1,2,3-Triazoles

Dominik Jankovič, Miha Virant, and Martin Gazvoda*

Cite this: *J. Org. Chem.* 2022, 87, 6, 4018–4028
Publication Date: February 11, 2022
https://doi.org/10.1021/acs.joc.1c02775
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Article Views 14854 | Altmetric 18 | Citations 10

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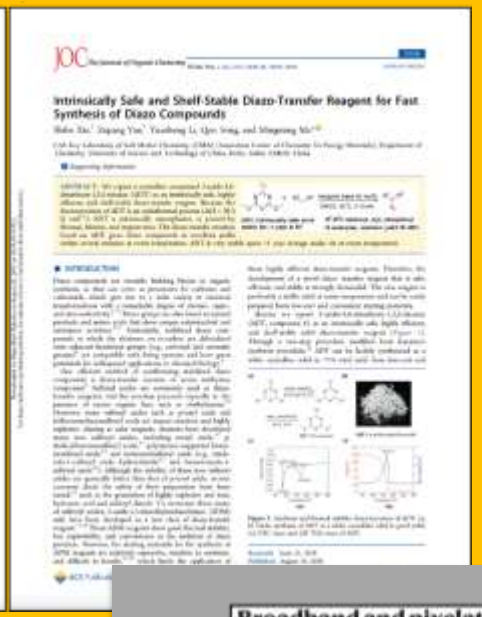
Year	Journal/ Correction Prompt	Correction Abstract
2011	Journal of the American Chemical Society/Accident[2]	It has come to our attention that during an attempted synthesis of compound 4 (2-(tert-butylsulfonyl)iodosylbenzene) described in this Communication, an explosion occurred that injured a laboratory worker,..
2022	Nature Materials/ Missing Safety Statement	Safety considerations. Although all the reactions were carried out at ambient temperature, mixtures of CH_4 and O_2 can be explosive. Therefore, all glassware and apparatus should be pressure proof with full appropriate containment and protective screening.”
2018	ACS Omega/ Typo	Since this dimanganese heptoxide (Mn_2O_7) is very unstable and explosive in nature, the reaction temperature was maintained below 5 °C [original paper stated 55 °C] during the addition of 6 g of KMnO4.
1985	Journal of Organic Chemistry/ Post Publication Correspondence	We wish to call particular attention to potential hazards in the use of tetrakis(acetonitrile) copper(I) perchlorate. Although we have had no explosion with this material, we have become aware of very serious accidents with other metal perchlorate acetonitrile adducts.
2014	Organic Letters/ Post Publication Data Reveals Safety Concerns	We have discovered a safety problem with the protocol for preparing (±)-7-azabicyclo[4,2,0]oct-3-en-8-one (1) as described in the Supporting Information….Recent efforts in our laboratories have revealed that this protocol carries a risk of dangerous pressure buildup in the reaction vessel.

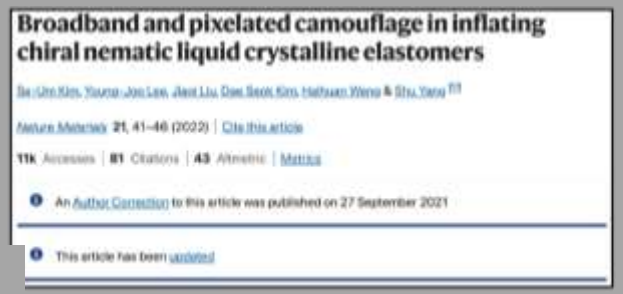
ACS

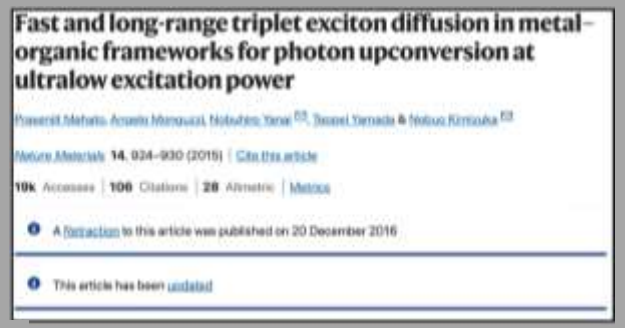


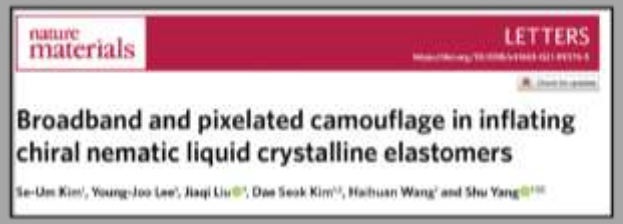
RSC

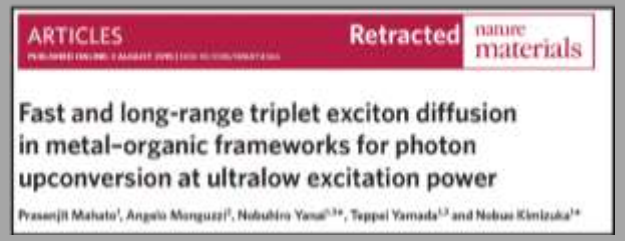
Wiley

Nature









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An Efficient, Inexpensive, and Shelf-Stable Diazotransfer Reagent: Imidazole-1-sulfonyl Azide Hydrochloride

Ethan D. Goddard-Borger and Robert V. Stick

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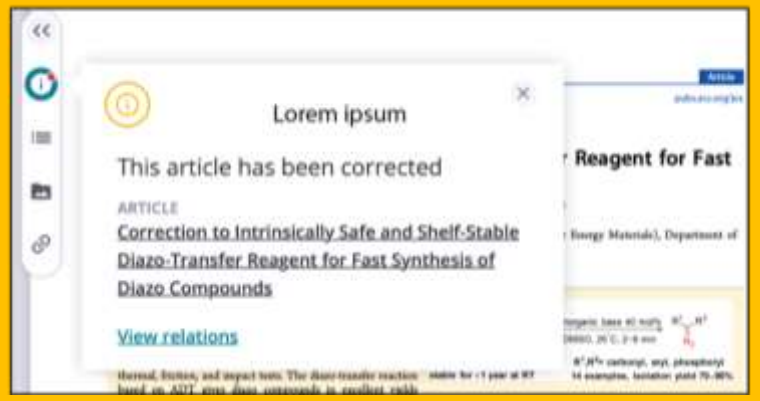

B)

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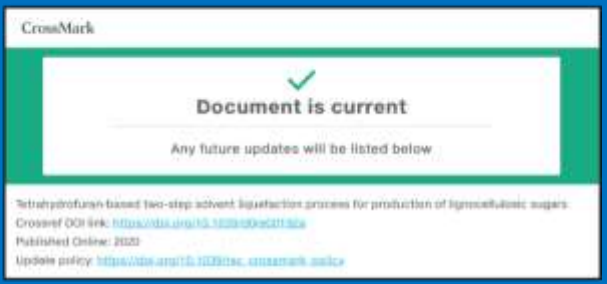

Intrinsically safe and shelf-stable diazo-transfer reagent for fast synthesis of diazo compounds [PDF] researchgate.net

S Xie, Z Yan, Y Li, Q Song, M Ma - The Journal of organic …, 2018 - ACS Publications

We report a crystalline compound 2-azido-4, 6-dimethoxy-1, 3, 5-triazine (ADT) as an intrinsically safe, highly efficient, and shelf-stable diazo-transfer reagent. Because the decomposition of ADT is an endothermal process (Δ H= 30.3 kJ mol–1), ADT is intrinsically nonexplosive, as proved by thermal, friction, and impact tests. The diazo-transfer reaction based on ADT gives diazo compounds in excellent yields within several minutes at room temperature. ADT is very stable upon> 1 year storage under air at room temperature.

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3. explosive
4. caution
5. injur*
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7. sensitive
8. intrinsically
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Method 1

~6,700 contained safety words or correction words → **5 safety**

Method 2

~1,000 matches → **12 safety**

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Method 3

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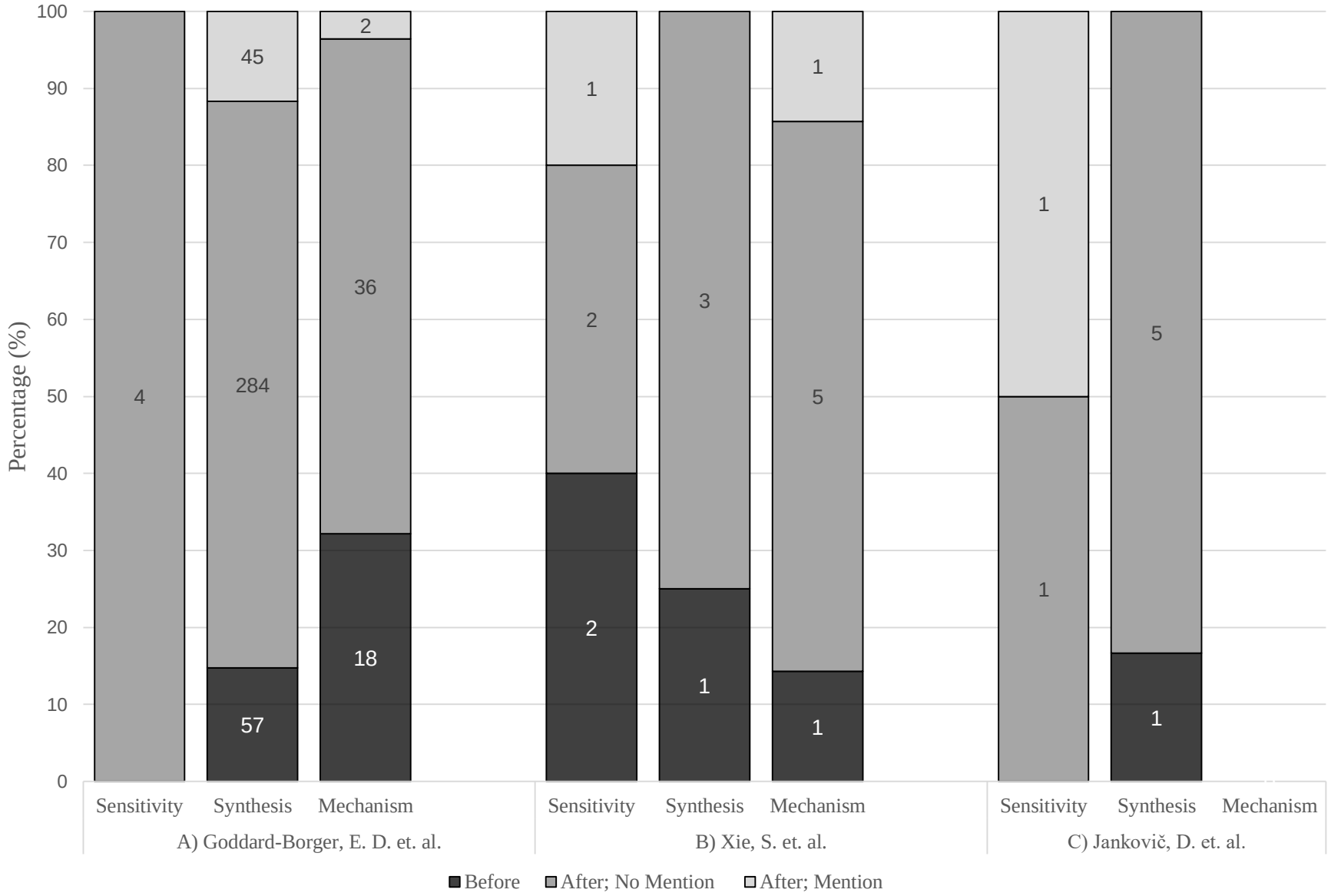
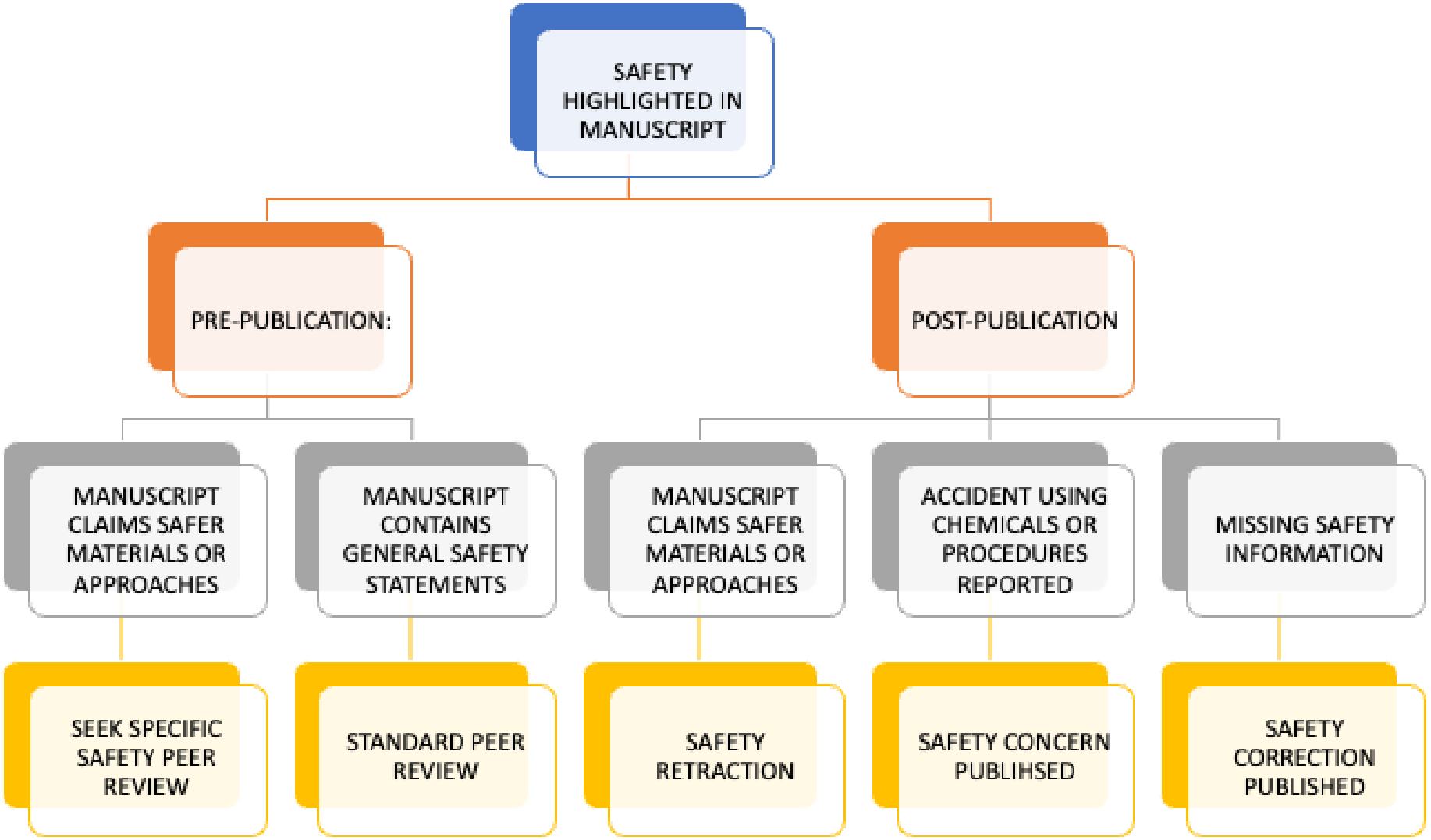


Safety Checklist for Reviewers and Authors

- Have authors identified hazards of intermediates, including data to support the claims?
- Are storage conditions for intermediates and products described?
- Have authors documented the maximum scale-up that has been safely performed?
- Is there safe disposal advice for the compounds prepared in the work?
- Has the data that informs the safe handling of compounds such as shock sensitivity, temperature sensitivity, moisture sensitivity, and flammability been included in the main body of the text or as supporting information?
- Do the authors give information about any observed degradation of an intermediate, even if the degradation product is not known?
- Are justifications for using reagents known to be very hazardous provided?

Safety pre- and post-publication



Questions