

literature melting point of dibenzalacetone

literature melting point of dibenzalacetone is a critical property widely studied in organic chemistry due to its significance in characterizing the purity and identity of this compound. Dibenzalacetone, a conjugated enone, is often employed in various chemical syntheses and photochemical studies, making its physical properties especially relevant. The melting point is a fundamental parameter that helps chemists verify the quality of synthesized dibenzalacetone and compare it against established standards. This article explores the literature melting point of dibenzalacetone in detail, including its significance, reported values across different sources, and factors influencing its melting behavior. Additionally, the discussion will cover methods used to determine the melting point and its implications in practical applications. Understanding these aspects is essential for researchers and practitioners working with dibenzalacetone in academic or industrial settings. The following sections provide a comprehensive overview of the topic.

- Significance of Melting Point in Dibenzalacetone Characterization
- Reported Literature Values for the Melting Point of Dibenzalacetone
- Factors Affecting the Melting Point of Dibenzalacetone
- Methods for Determining the Melting Point
- Applications and Relevance of Melting Point Data

Significance of Melting Point in Dibenzalacetone Characterization

The literature melting point of dibenzalacetone plays a vital role in the compound's characterization and quality control. Melting point is an intrinsic physical property that indicates the temperature at which a solid turns into a liquid under atmospheric pressure. For dibenzalacetone, this temperature is often used as a benchmark to assess the purity of the sample. Pure compounds typically have sharp and consistent melting points, whereas impurities cause depression and broadening of the melting range. Consequently, the melting point serves as a diagnostic tool during synthesis and purification processes.

In research and industrial laboratories, confirming the melting point of dibenzalacetone against literature values ensures that the compound meets required specifications. This is especially important in organic synthesis where dibenzalacetone serves as a precursor or intermediate. Furthermore, the melting point can provide insights into the molecular structure and intermolecular forces present in the compound, as well as its crystallinity. Thus, the literature melting point is not only a reference value but also a practical parameter in chemical analysis.

Reported Literature Values for the Melting Point of Dibenzalacetone

Various scientific sources and chemical databases document the melting point of dibenzalacetone, providing a range of values due to differences in sample purity, experimental conditions, and measurement techniques. Generally, the literature melting point of dibenzalacetone is reported to fall within the range of approximately 110°C to 115°C.

Some commonly cited values include:

- 113-115°C – as reported in standard organic chemistry textbooks and synthesis manuals.
- 110-113°C – observed in practical laboratory syntheses where minor impurities may be present.
- 114°C (sharp) – recorded under controlled conditions with high-purity samples.

These variations highlight the importance of cross-referencing multiple literature sources when verifying the melting point. Additionally, the crystalline form and solvent residues can influence the observed melting point, leading to slight discrepancies. Reliable data on the literature melting point of dibenzalacetone is essential for accurate compound identification and comparison.

Factors Affecting the Melting Point of Dibenzalacetone

The melting point of dibenzalacetone is influenced by several factors that can cause deviation from the standard literature values. Understanding these factors is crucial for interpreting melting point data correctly.

Purity of the Sample

Impurities generally lower and broaden the melting point range. Even small amounts of contaminants can significantly affect melting behavior, making purity a primary factor in melting point determination.

Polymorphism

Dibenzalacetone may exist in different crystalline forms, or polymorphs, which can exhibit distinct melting points. Polymorphic transitions can cause variability in the literature melting point depending on the crystalline phase present.

Heating Rate and Experimental Conditions

The rate at which the sample is heated during melting point determination affects the observed value. Rapid heating can lead to inaccurate or elevated melting points, whereas slow and controlled heating yields more precise measurements.

Sample Preparation and Particle Size

How the sample is prepared—the fineness of the powder, packing density in the capillary tube, and presence of solvent residues—can influence melting point measurements. Proper preparation ensures consistency with literature values.

In summary, these factors must be carefully controlled and documented to obtain melting point data that aligns with the literature melting point of dibenzalacetone.

Methods for Determining the Melting Point

Accurate determination of the melting point of dibenzalacetone requires appropriate analytical techniques and instrumentation. The following are commonly used methods:

1. **Capillary Melting Point Apparatus:** This traditional method involves packing a small amount of the compound into a thin capillary tube and heating it under controlled conditions while observing the melting process. It is widely used due to its simplicity and reliability.
2. **Differential Scanning Calorimetry (DSC):** DSC measures heat flow associated with phase transitions, providing precise melting point data and thermodynamic information. It is especially useful for detecting polymorphs and assessing purity.
3. **Hot-Stage Microscopy:** This technique combines microscopic observation with controlled heating, allowing visual identification of melting behavior and crystal morphology changes.

Each method has advantages and limitations. Capillary apparatus is cost-effective and accessible for routine analysis, while DSC offers enhanced sensitivity and quantitative data. Proper calibration of instruments and adherence to standardized procedures are essential to achieve results consistent with the literature melting point of dibenzalacetone.

Applications and Relevance of Melting Point Data

The literature melting point of dibenzalacetone is not only a fundamental physical property but also a valuable parameter in various scientific and industrial contexts.

Quality Control in Chemical Synthesis

During the synthesis of dibenzalacetone, monitoring the melting point ensures the effectiveness of purification steps and confirms the identity of the final product. Deviations from the expected melting point may indicate incomplete reactions or contamination.

Material Characterization and Research

Researchers studying the chemical and physical properties of dibenzalacetone rely on accurate melting point data to correlate structure-property relationships. Melting point serves as an indicator of molecular packing and intermolecular interactions.

Educational and Laboratory Training

In academic settings, determining the melting point of dibenzalacetone is a common experiment that teaches students principles of organic compound identification, purity assessment, and analytical techniques.

- Ensures reproducibility in synthetic protocols.
- Supports development of new derivatives and analogs.
- Facilitates comparison between theoretical and experimental data.

Overall, the literature melting point of dibenzalacetone is integral to the compound's application across multiple disciplines, underscoring its importance in both practical and theoretical chemistry.

Frequently Asked Questions

What is the literature melting point of dibenzalacetone?

The literature melting point of dibenzalacetone typically ranges from 110°C to 115°C, depending on the purity and measurement conditions.

Why is there variation in the reported melting point of dibenzalacetone in literature?

Variations in melting point values for dibenzalacetone can arise due to differences in sample purity, measurement techniques, heating rates, and experimental conditions.

How does the melting point of dibenzalacetone compare to similar chalcone derivatives?

Dibenzalacetone generally has a melting point around 110-115°C, which is relatively moderate compared to other chalcone derivatives that may have higher or lower melting points depending on their substituents.

What experimental methods are commonly used to determine the melting point of dibenzalacetone?

Common methods include capillary tube melting point determination using a melting point apparatus, differential scanning calorimetry (DSC), and sometimes hot stage microscopy.

How does impurities affect the melting point of

dibenzalacetone reported in literature?

Impurities typically cause a depression and broadening of the melting point range, leading to lower and less sharp melting points compared to pure dibenzalacetone.

Where can one find reliable literature data on the melting point of dibenzalacetone?

Reliable melting point data for dibenzalacetone can be found in standard organic chemistry reference books, peer-reviewed journal articles, chemical supplier catalogs, and databases such as Sigma-Aldrich, ChemSpider, and the CRC Handbook of Chemistry and Physics.

Additional Resources

1. *The Chemistry of Dibenzalacetone: Structure and Properties*

This book offers an in-depth exploration of dibenzalacetone's chemical structure and physical properties, including its melting point. It covers various analytical techniques used to determine melting points and other thermal characteristics. Ideal for chemists and students, it bridges fundamental concepts with practical laboratory insights.

2. *Thermal Analysis in Organic Chemistry: Case Studies on Dibenzalacetone*

Focusing on thermal analysis methods, this volume presents detailed case studies on dibenzalacetone and related compounds. It explains how melting point data correlates with molecular stability and purity. Readers gain hands-on knowledge about differential scanning calorimetry (DSC) and thermogravimetric analysis (TGA).

3. *Organic Synthesis and Characterization: The Role of Melting Points*

This comprehensive guide discusses how melting point determination is critical in verifying the identity and purity of organic compounds like dibenzalacetone. It includes step-by-step synthesis protocols and characterization techniques. The text is useful for both beginners and advanced organic chemistry practitioners.

4. *Physical Properties of Chalcones: Melting Points and Beyond*

Chalcones, including dibenzalacetone, have unique physical and chemical properties. This book delves into their melting points, solubility, and crystallographic data. It also examines how substituents affect these properties, providing valuable information for material scientists and chemists.

5. *Melting Point Determination: Techniques and Applications in Organic Chemistry*

An essential resource for laboratory work, this book details various methods for determining melting points accurately. It highlights the significance of melting point in studying compounds like dibenzalacetone. The text also discusses common errors and troubleshooting tips.

6. *Advanced Organic Chemistry: Spectroscopy and Physical Constants*

Covering a broad spectrum of organic compounds, this text includes a section on dibenzalacetone's melting point and spectroscopic data. It integrates melting point analysis with other characterization methods like NMR and IR spectroscopy. Students and researchers benefit from its detailed physical constant tables.

7. *Applied Organic Chemistry: From Synthesis to Analysis*

This practical guidebook connects synthetic procedures with analytical techniques, emphasizing melting point determination of intermediates and final products such as dibenzalacetone. It is designed for industrial chemists and academic researchers focused on organic compound validation.

8. *Crystallography and Thermal Behavior of Organic Molecules*

Focusing on the crystalline nature of organic compounds, this book explores how melting points relate to molecular packing and crystal lattice energies. Dibenzalacetone serves as a model compound to illustrate these principles. The work is valuable for chemists interested in material design and pharmaceuticals.

9. *Handbook of Organic Compound Properties: Melting Points and Beyond*

This extensive handbook compiles physical and chemical properties of numerous organic compounds, including dibenzalacetone. It features melting point data alongside boiling points, solubility, and stability information. The book serves as a quick reference for chemists working in research and development.

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