Spectral Data for Benzophenone

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Lab Section 1A05

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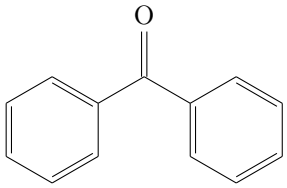
Classification

- IUPAC name: Diphenylmethanone.
- Picture:



Spectral Data

1.

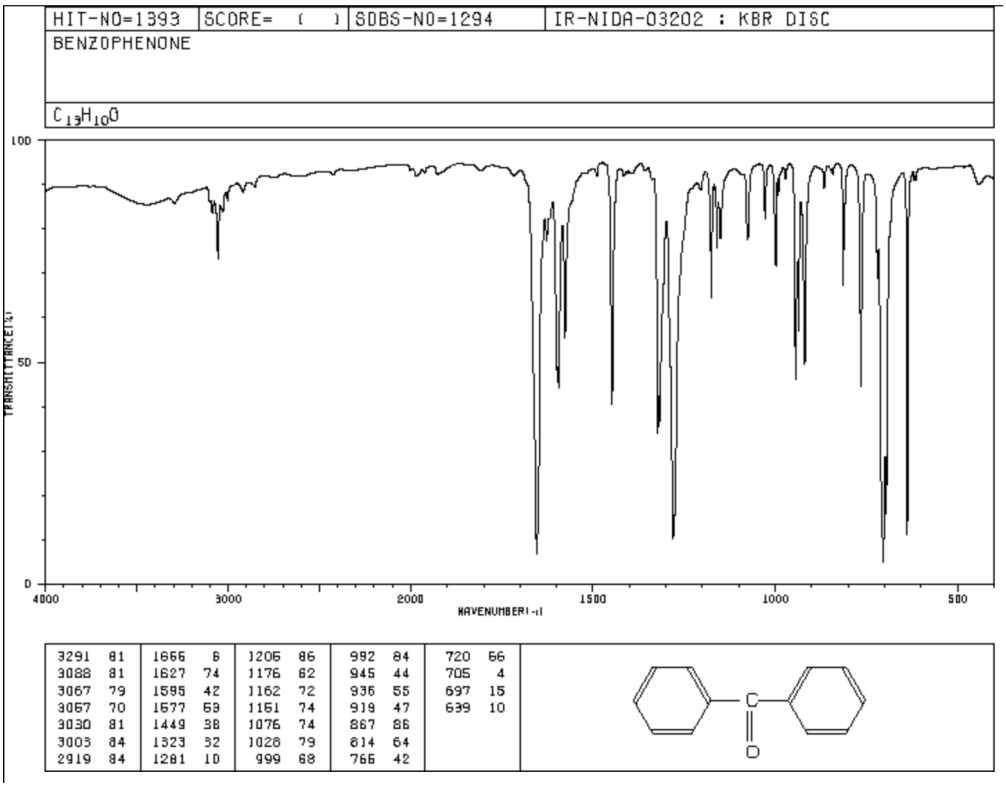


Figure 1: IR spectrum of benzophenone[1].

2.

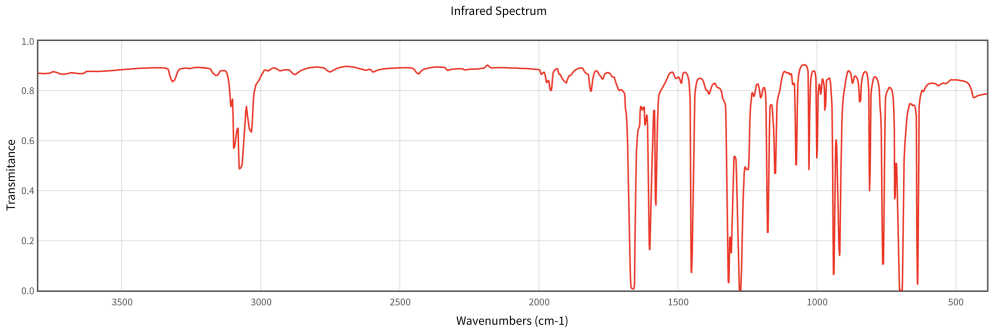


Figure 2: IR spectrum of benzophenone[2].

3. Information in common:
   - Molecule identifying information.
   - The IR Spectrum from the SDBS database has data for much higher wavenumbers than the IR Spectrum from NIST.
4. Carbonyl data:
   - Based on the IR spectra, benzophenone may have a carbonyl since we have a peak in the vicinity of $1710\,\mathrm{cm}^{-1}$ to $1735\,\mathrm{cm}^{-1}$ although not strictly at it. This carbonyl is part of a ketone, and the wavenumber of the peak (from Figure 1) is $1666\,\mathrm{cm}^{-1}$. This is consistent with the fact that benzophenone does have a carbonyl.
5. Alcohol/amine data:
   - Based on the IR spectra, benzophenone has neither an alcohol nor an amine since neither spectrum shows a peak at either $3400\,\mathrm{cm}^{-1}$ or $3300\,\mathrm{cm}^{-1}$, respectively. This is consistent with the fact that benzophenone has neither an alcohol nor an amine.
6. Alkyne/nitrile data:
   - Based on the IR spectra, benzophenone has neither an alkyne nor a nitrile since neither spectrum shows a peak from $2100\,\mathrm{cm}^{-1}$ to $2300\,\mathrm{cm}^{-1}$. This is consistent with the fact that benzophenone has neither an alkyne nor a nitrile.
7. Most prominent C–H absorption peak:
   - The sp^2 C–H peak, just to the left of $3000\,\mathrm{cm}^{-1}$, is the most prominent (and only) C–H peak. This is consistent with the fact that benzophenone has only sp^2 C–H bonds (no sp^3 or sp C–H) and, in fact, only sp^2 hybridized carbons.
8. Other prominent stretches:
   - There appears to be some aromatic activity in the vicinity of $1500\,\mathrm{cm}^{-1}$, owing to benzophenone's two aromatic rings. Consistent with the structure, there is not other distinguishing activity.

References

(1) SDBSWeb National Institute of Advanced Industrial Science and Technology `https://sdbs.db.aist.go.jp/sdbs/cgi-bin/landingpage?sdbsno=1294` (accessed 10/22/2021).

(2) Johnson, T. J.; Myers, T. L.; Su, Y.-F.; Tonkyn, R. G.; Kelly-Gorham, M. R. K.; Danby, T. O. In National Institute of Standards and Technology *NIST Chemistry WebBook, NIST Standard Reference Database Number 69*, Linstrom, P. J., Mallard, W. G., Eds., Gaithersburg MD, 20899, (accessed 10/22/2021).