

## RESEARCH PAPER

# Sonosynthesis of Pyrimidines as Antimicrobial Agents Using Nano-Fe<sub>3</sub>O<sub>4</sub>-L-cysteine

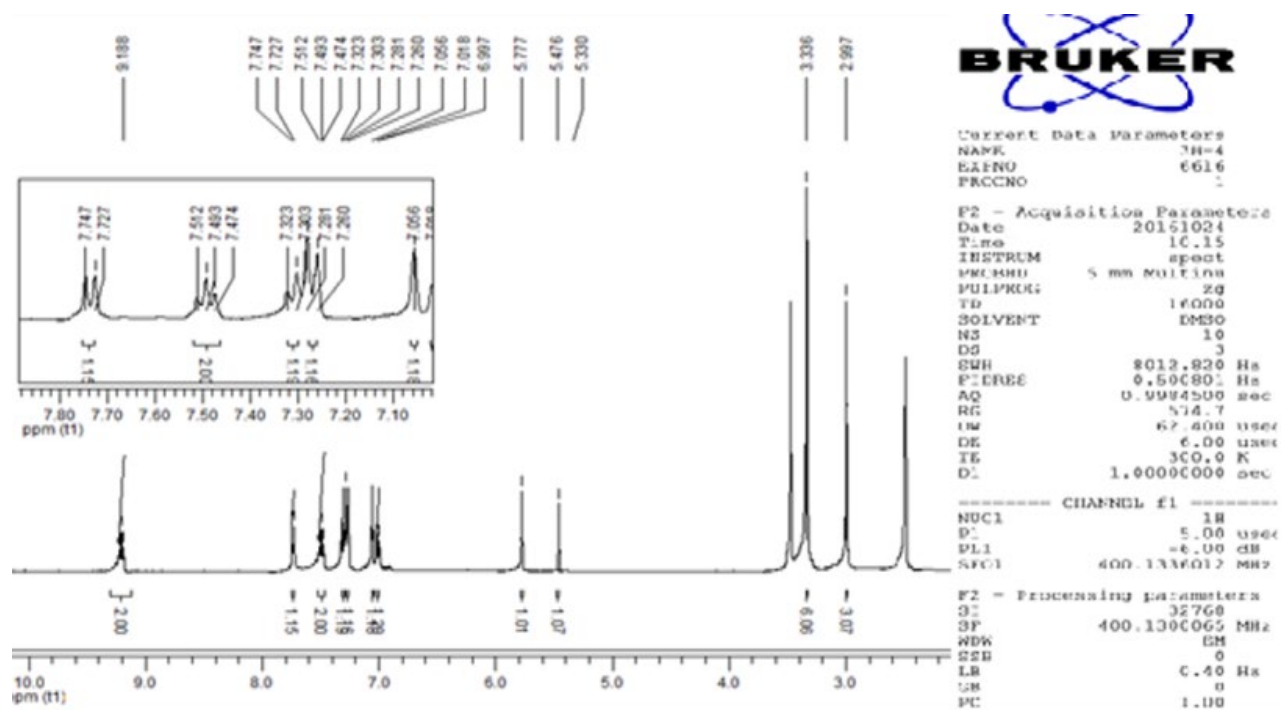
Hossein Shahbazi-Alavi <sup>1,\*</sup>, Javad Safaei-Ghomi <sup>2</sup>

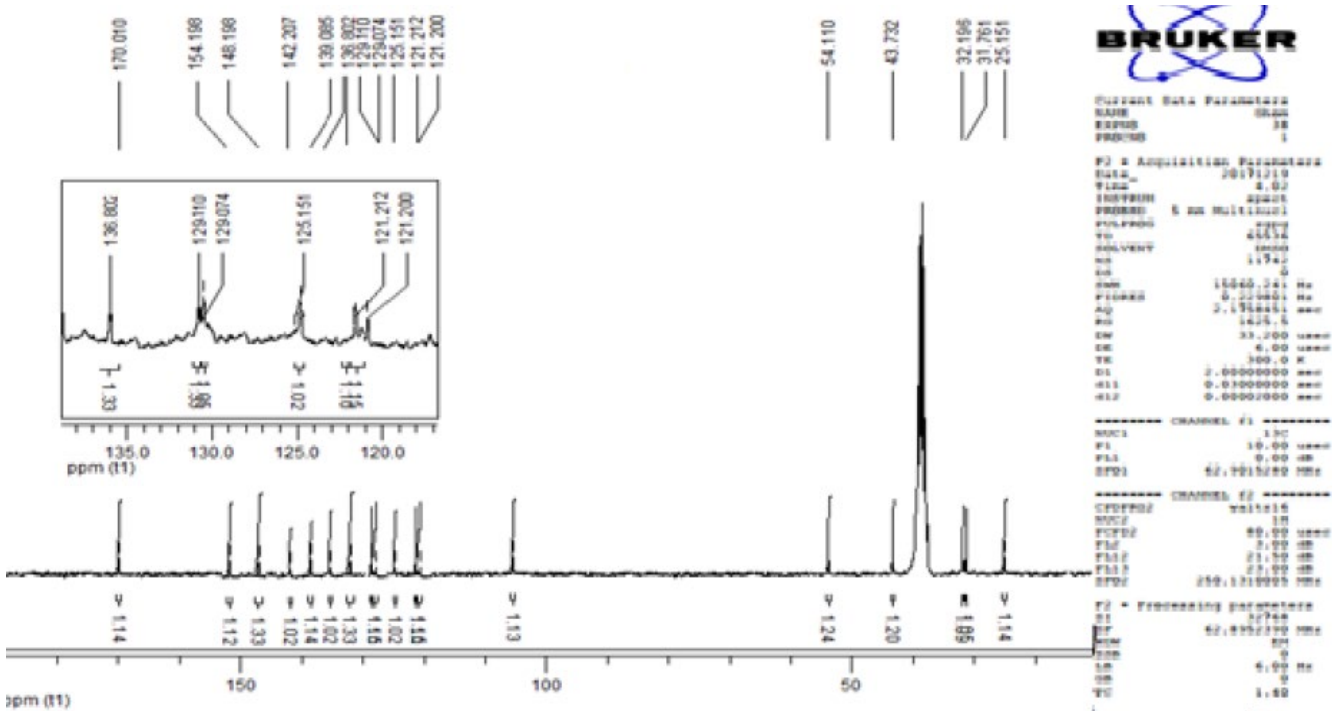
<sup>1</sup> Young Researchers and Elite Club, Kashan Branch, Islamic Azad University, Kashan, Iran

<sup>2</sup> Department of Organic Chemistry, Faculty of Chemistry, University of Kashan, Kashan, Iran

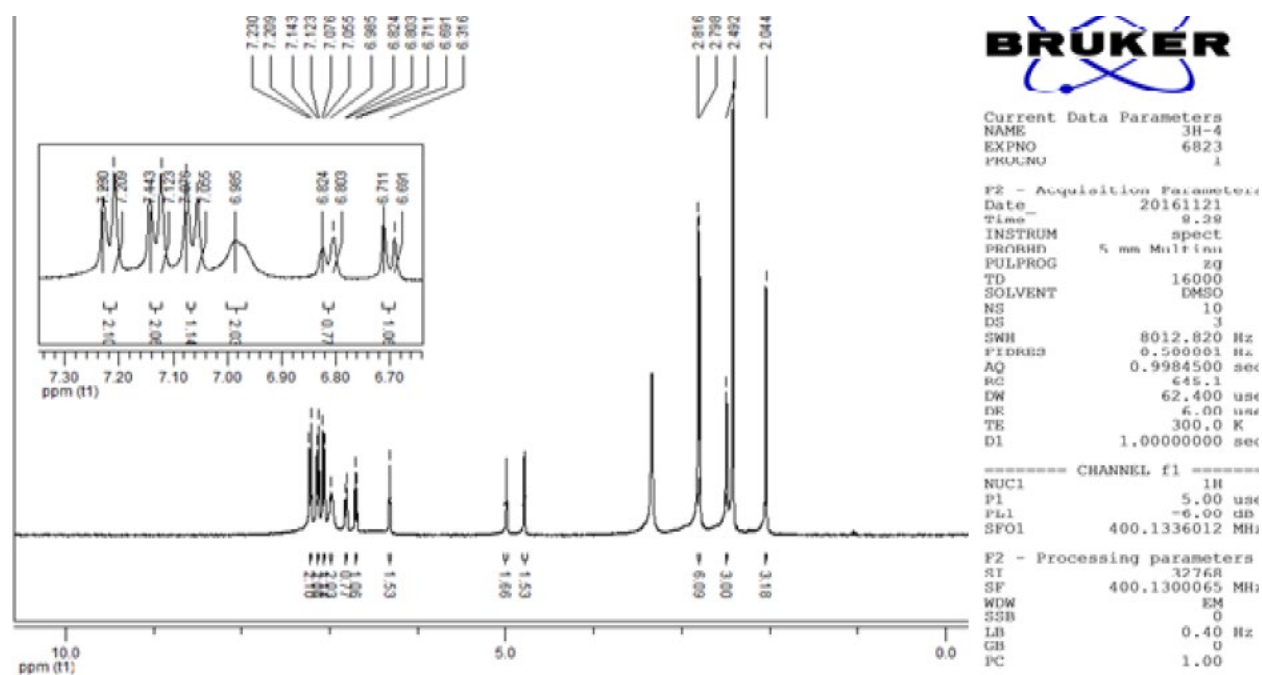
<b>ARTICLE INFO</b> -----  <b>Article History:</b> <a href="#">Received 17 February 2022</a> <a href="#">Accepted 14 April 2022</a> <a href="#">Published 1 May 2022</a> ----- <b>Keywords:</b> Nanocatalyst Pyrimidines Ultrasonic Antimicrobial Nano-Fe <sub>3</sub> O <sub>4</sub>	<b>ABSTRACT</b>  Nano-Fe <sub>3</sub> O <sub>4</sub> -L-cysteine as a superior catalyst was applied for the synthesis of pyrimidine-trions by three-component reactions of N,N-dimethylbarbituric acid, benzaldehydes and para-methyl aniline or para-methoxy aniline under ultrasonic irradiation in ethanol. The catalyst was characterized by SEM, FT-IR, XRD, TGA, EDS and VSM. In addition, screening diverse catalysts containing Et <sub>3</sub> N, <i>p</i> -TSA, nano NiO, nano Fe <sub>3</sub> O <sub>4</sub> , cysteine and nano-Fe <sub>3</sub> O <sub>4</sub> -L-cysteine revealed nano-Fe <sub>3</sub> O <sub>4</sub> -L-cysteine (4 mg) as the most effective catalyst to perform this reaction under ultrasonic irradiation in ethanol. Further, the compounds <b>4b</b> (5-((2-amino-5-methoxyphenyl)(4-(methylthio)phenyl)methyl)-1,3-dimethylpyrimidine-2,4,6(1H,3H,5H)-trione), <b>4c</b> (5-((2-amino-5-methoxyphenyl)(4-chlorophenyl)methyl)-1,3-dimethylpyrimidine 2,4,6(1H,3H,5H)-trione) and <b>4f</b> (5-((2-amino-5-methylphenyl)(2,4-dichlorophenyl)methyl)-1,3-dimethylpyrimidine-2,4,6 (1H,3H,5H)-trione) have moderate growth inhibitory effects on Gram positive bacteria ( <i>Staphylococcus aureus</i> , <i>Bacillus subtilis</i> ; and <i>Staphylococcus epidermidis</i> ). The compound of <b>4b</b> has moderate growth inhibitory effects on fungi. This technique provides several benefits including the use of ultrasonic irradiation, great yields in concise times, retrievability the nanocatalyst and low nanocatalyst loading. The present catalytic method is extensible to a wide range of substrates for the preparation of a variety-oriented library of pyrimidines.
<b>How to cite this article</b> Shahbazi-Alavi H., Safaei-Ghomi J. Sonosynthesis of Pyrimidines as Antimicrobial Agents Using Nano-Fe <sub>3</sub> O <sub>4</sub> -L-cysteine. <i>Nanochem Res</i> , 2022; 7(1):28-35. DOI: 10.22036/ncr.2022.01.005	

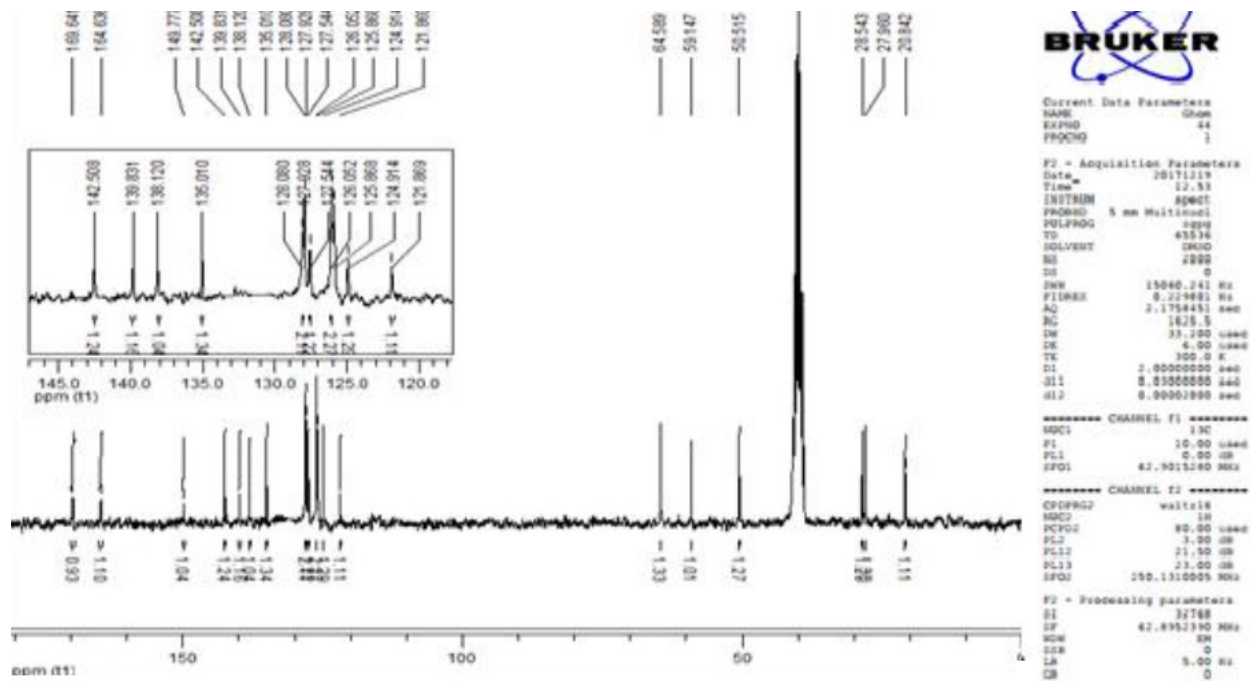
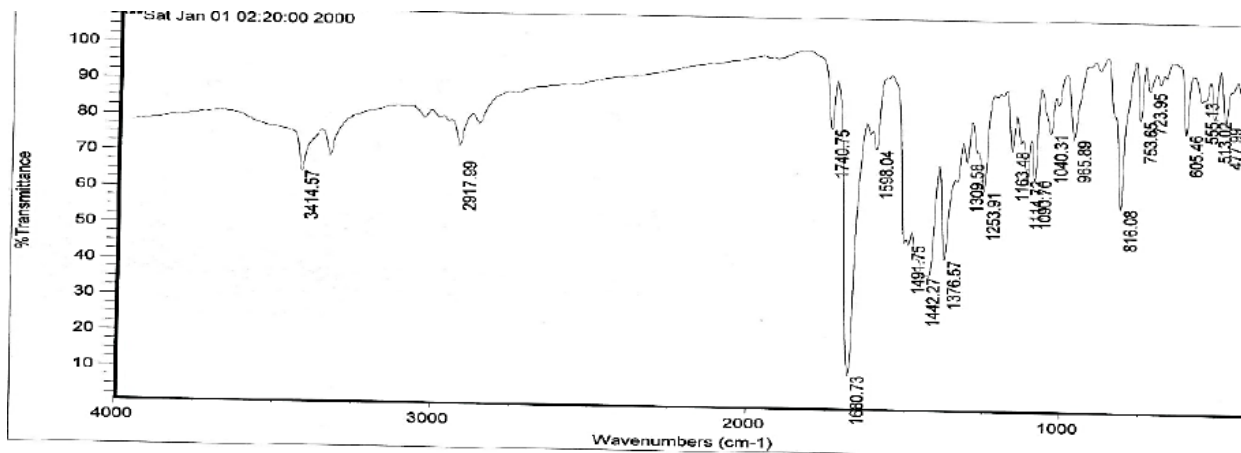
5-((2-amino-5-methylphenyl)(2-nitrophenyl)methyl)-1,3-dimethylpyrimidine-2,4,6(1H,3H,5H)-trione (4a):



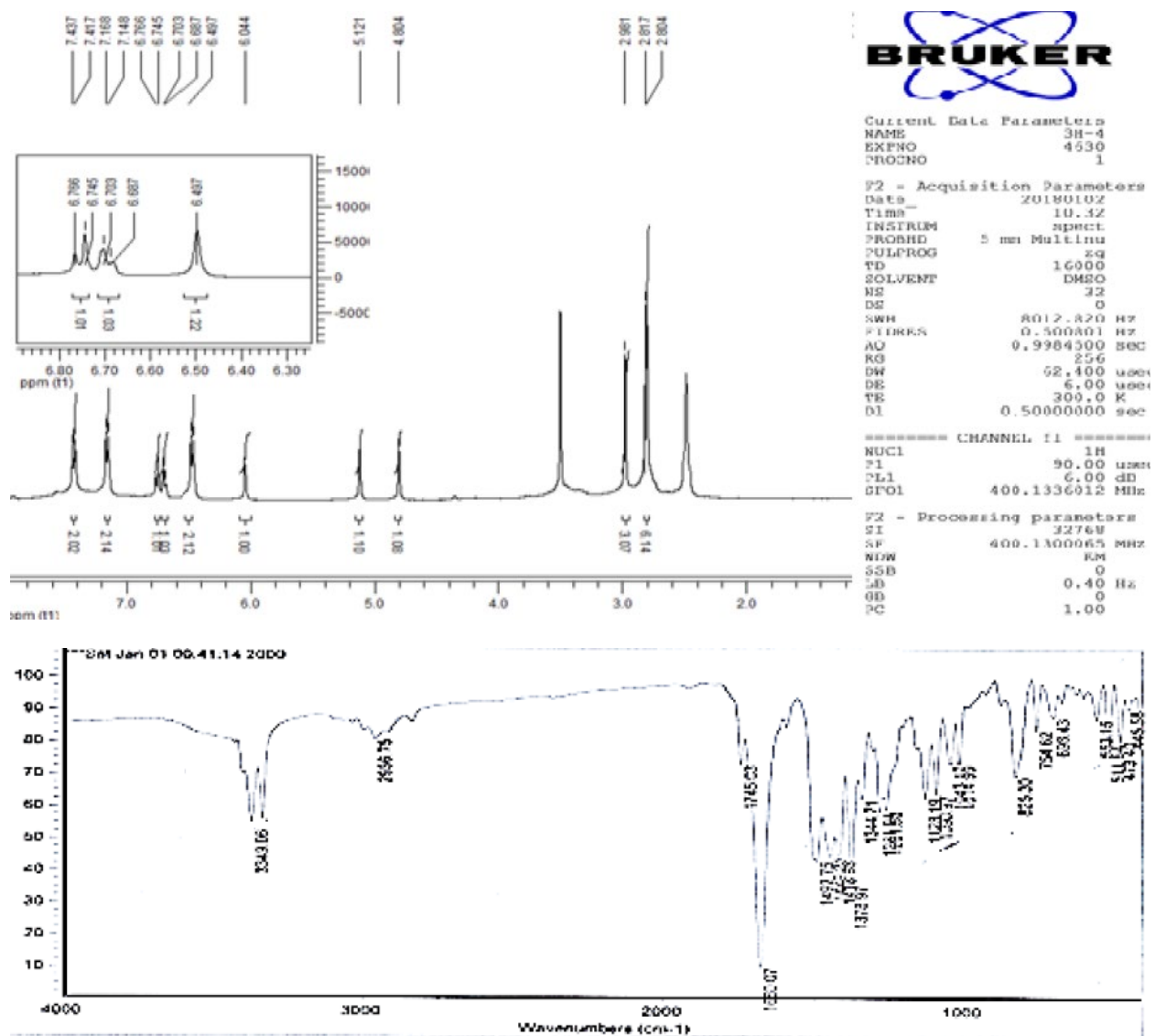


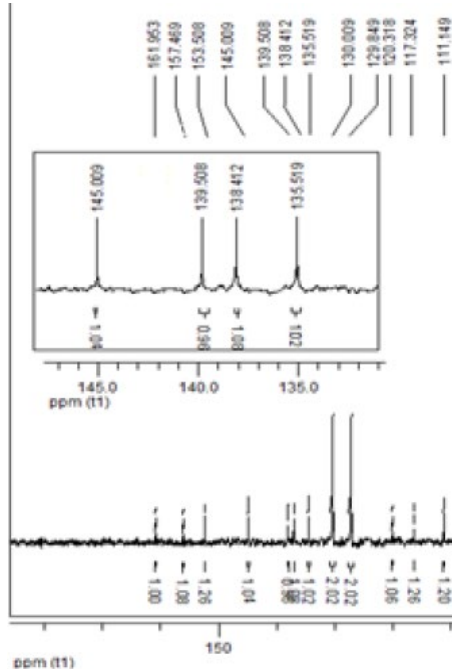
5-((2-amino-5-methoxyphenyl)(4-(methylthio)phenyl)methyl)-1,3-dimethylpyrimidine-2,4,6(1H,3H,5H)-trione (4b):





2,4,6(1H,3H,5H)-trione (4c):





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PROCNO: 1

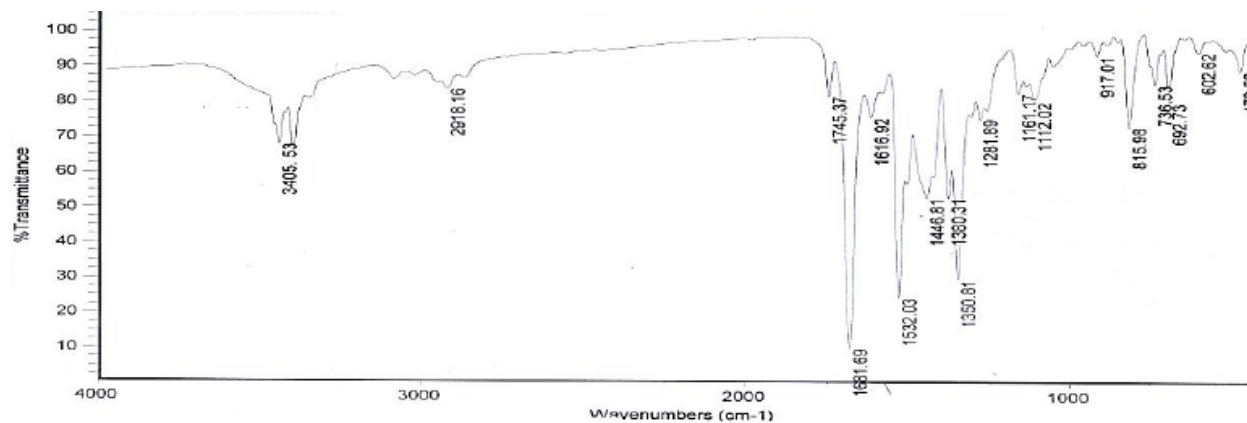
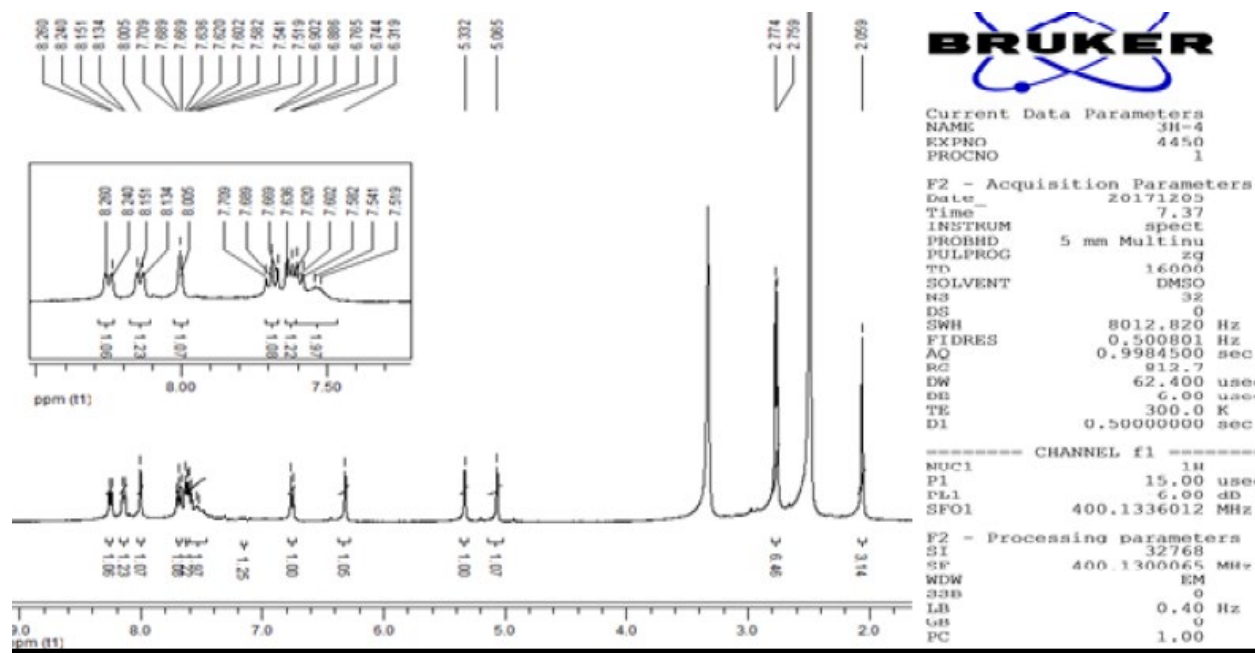
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DS: 0  
SWH: 15060.341 Hz  
FIDRES: 0.278801 Hz  
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RG: 1625.5  
RW: 33.250 usec  
DE: 6.00 usec  
TE: 300.2 K  
D1: 2.00000000 sec  
d11: 0.01000000 sec  
d12: 0.00000000 sec

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PL1: 0.00 dB  
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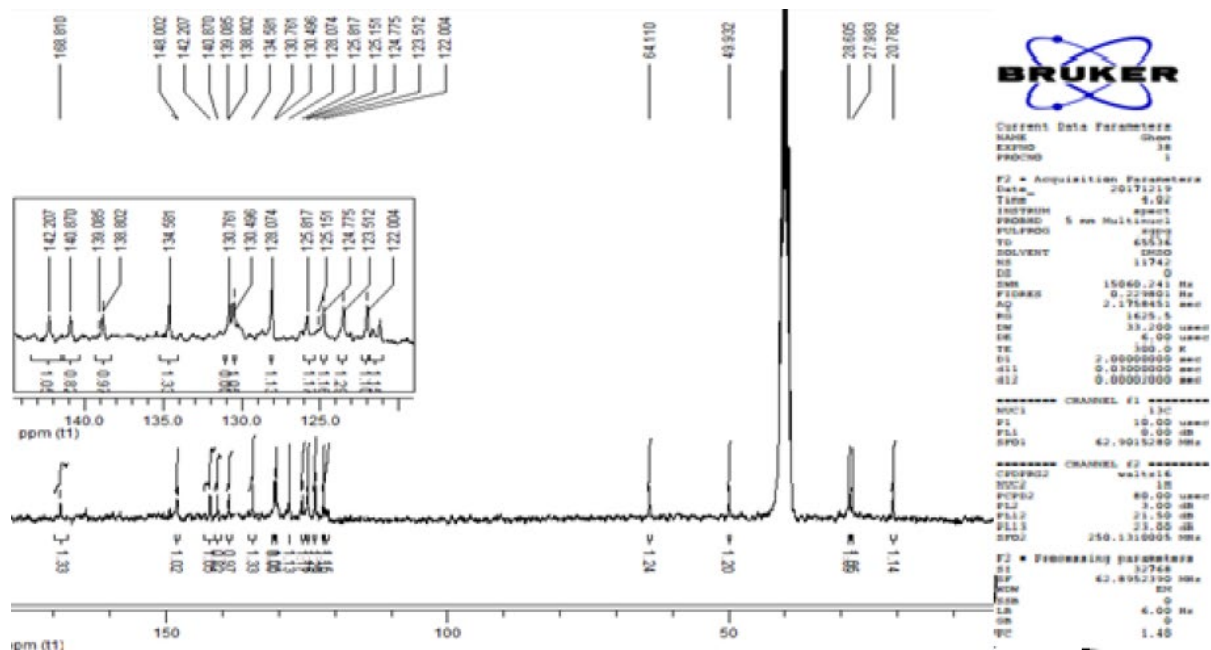
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SFO2: 250.1310005 MHz

F2 - Processing parameters  
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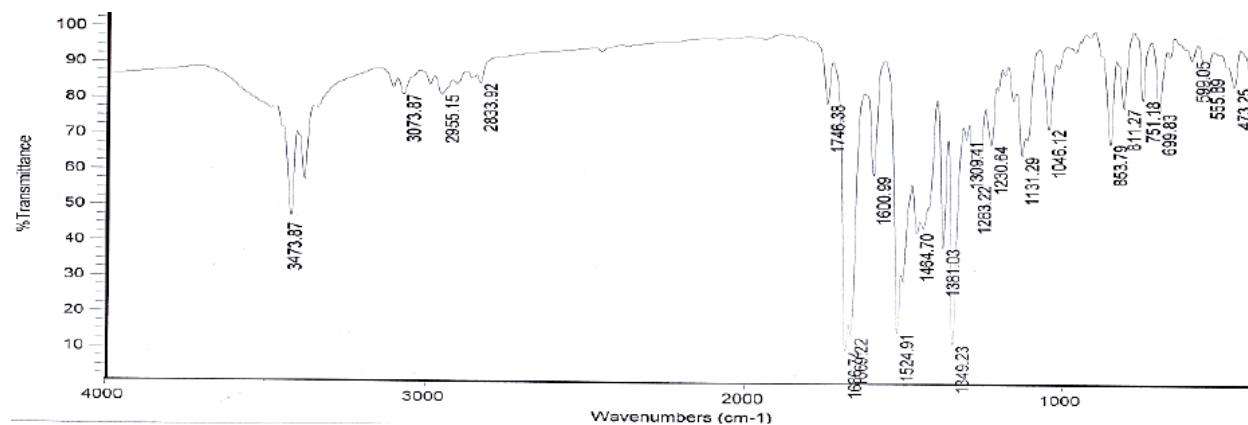
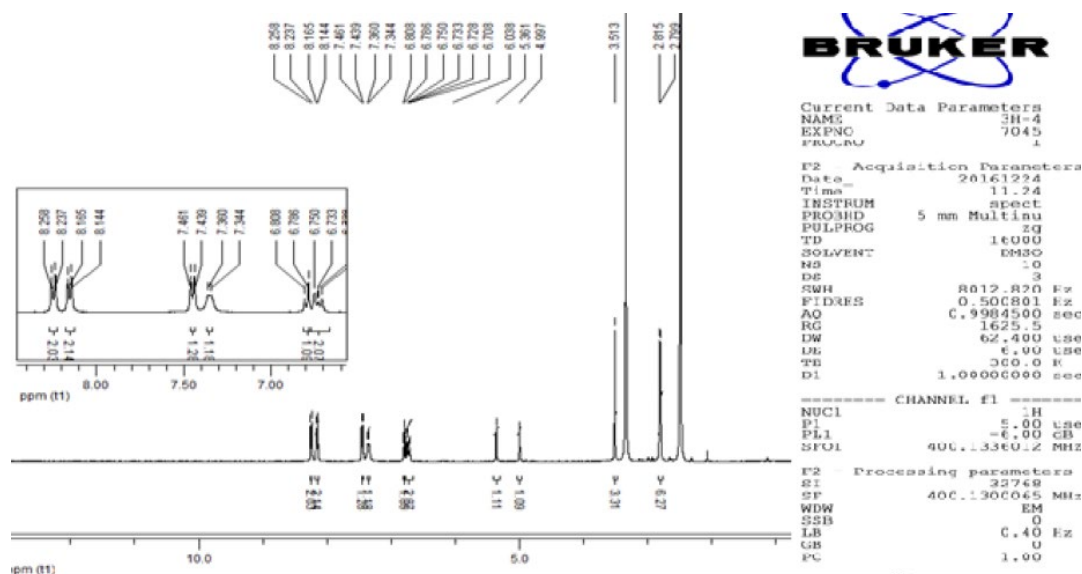
5-((2-amino-5-methylphenyl)(3-nitrophenyl)methyl)-1,3-dimethylpyrimidine-2,4,6(1H,3H,5H)-trione (4d):

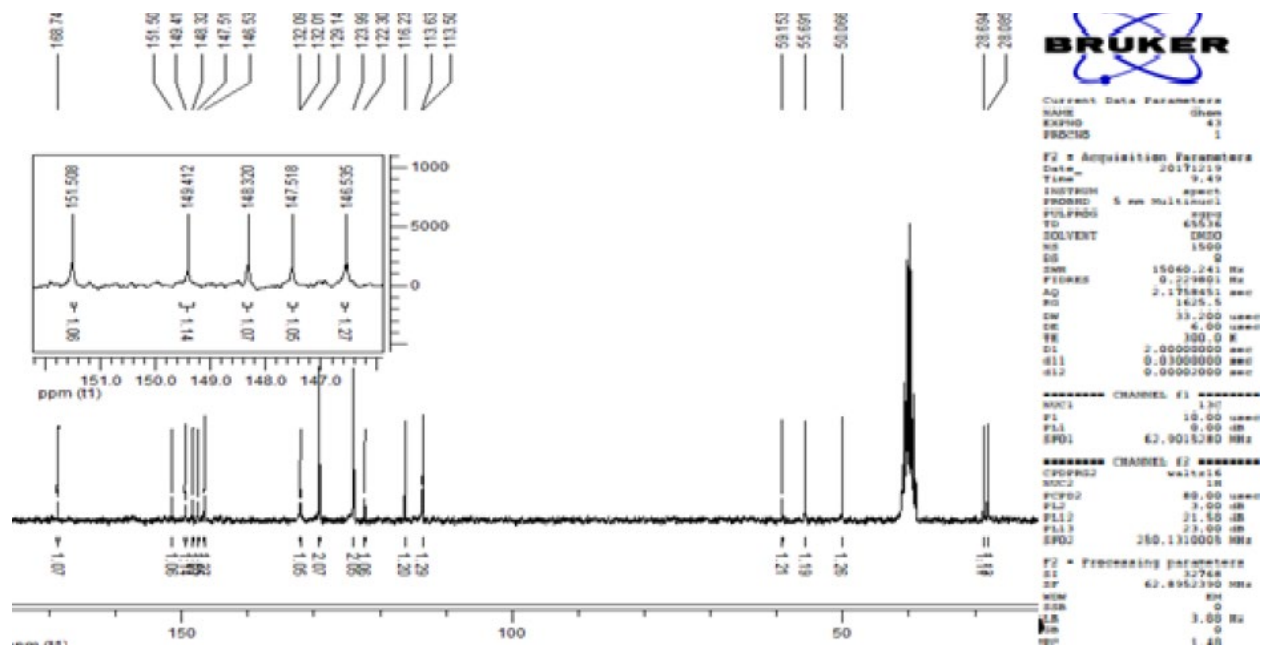




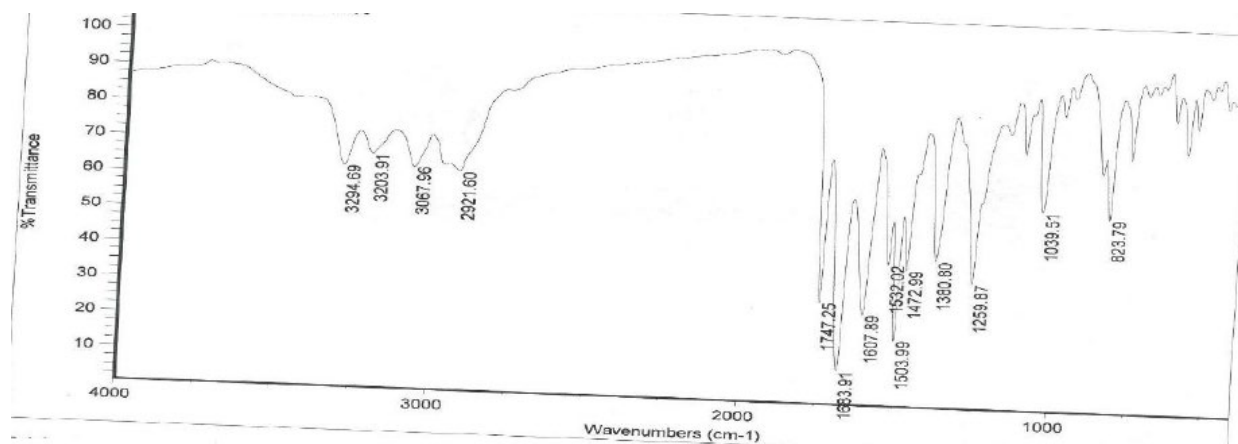
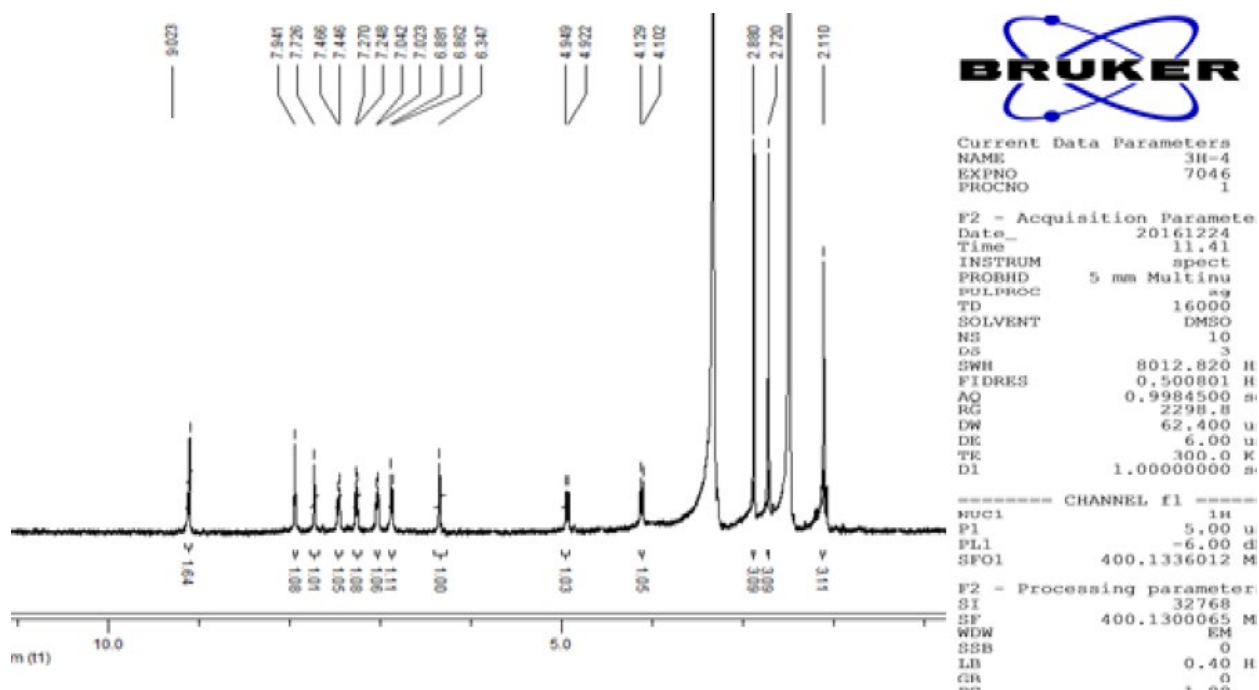


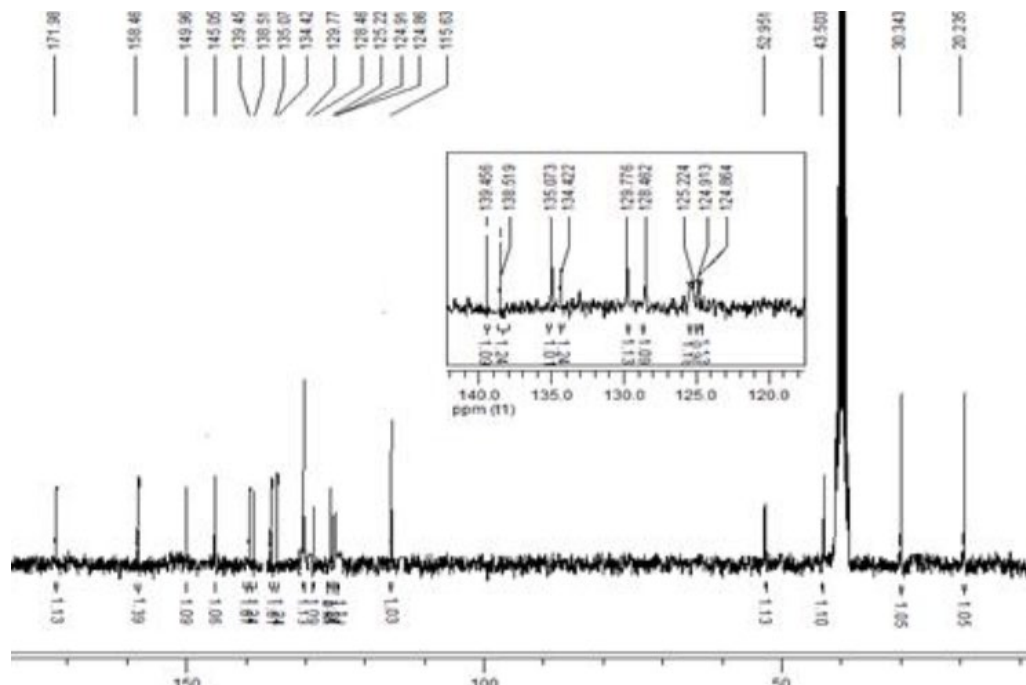
5-((2-amino-5-methoxyphenyl)(4-nitrophenyl)methyl)-1,3-dimethylpyrimidine-2,4,6(1H,3H,5H)-trione (4e):





5-((2-amino-5-methylphenyl)(2,4-dichlorophenyl)methyl)-1,3-dimethylpyrimidine-  
2,4,6(1H,3H,5H)-trione (4f):





Current Data Parameters  
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SOLVENT: DMSO  
NS: 1500  
DS: 4  
SWH: 15040.241 MHz  
FIDRES: 0.229601 MHz  
AQ: 2.1718451 sec  
RG: 1638.5  
DW: 33.200 usec  
DE: 4.00 usec  
TE: 300.2 K  
D1: 2.00000000 sec  
d11: 0.03000000 sec  
d12: 0.00000000 sec

===== CHANNEL f1 =====  
NUC1: 13C  
P1: 18.00 usec  
PL1: 0.00 dB  
SFO1: 62.9015280 MHz

===== CHANNEL f2 =====  
CPROG2: waltz16  
NUC2: 1H  
PCPD2: 88.00 usec  
PL2: 2.00 dB  
PL12: 21.50 dB  
PL13: 23.00 dB  
SFO2: 250.1310006 MHz

F2 - Processing parameters  
SI: 32768  
SF: 62.8962390 MHz  
WDW: EM  
SSB: 0  
LB: 3.00 MHz  
GB: 0  
PC: 1.40

5-((2-amino-5-methoxyphenyl)(4-fluorophenyl)methyl)-1,3-dimethylpyrimidine-

2,4,6(1H,3H,5H)-trione (4g):

