

acetyl chloride (1.970ml) mixed and stirred for 5h at 80°C. At the end of reaction that tested by TLC. Reaction material transferred in cold water. Precipitate dissolved in dichloromethane and filtration was performed. Oily layer immersed on the silica gel. Further product purified through column.

3.2. Microwave Assisted Synthesis

3.2.1. General procedure for synthesis of derivatives of β -acetamidoketones under microwave irradiation

Aryl aldehyde (1 mmol), aryl ketone (1mmol), acetonitrile (4mL), acetyl chloride (2mL) and zinc oxide (0.5g) were mixed and subjected to microwave radiation for 2min. Then mixture was dispensed into ice cold water (50mL). Precipitate extracted with dichloromethane. Filtration was done, organic layer dried on silica gel. Pure product obtained through column chromatography using two solvents ether and ethyl acetate.

3.2.2. Synthesis of N-(1, 3-diphenyl-3-oxopropyl) acetamide under microwave irradiation (P1)

Benzaldehyde (1.063mL), acetophenon (1.063mL), acetonitrile (4mL), acetyl chloride (2mL) and zinc oxide (0.5g) were mixed and subjected to microwave radiation for 2min. Then mixture was dispensed into ice cold water (50mL). Precipitate extracted with dichloromethane. Filtration was done, organic layer dried on silica gel. Pure product obtained through column chromatography using two solvents ether and ethyl acetate.

3.2.3. Synthesis of N-[1-(4-chlorophenyl)-3-phenyl-oxopropyl] acetamide under microwave irradiation (P2)

4-chlorobenzaldehyde (1.067ml), acetonitrile (2.102mL), acetophenon (1.102mL), zinc oxide (0.5g) and acetyl chloride (2.178mL) mixed and subjected to the microwave radiations for 1.5min. Reaction mixture transferred into ice water (50mL). Precipitate dissolved into dichloromethane. Filtration carried out, organic layer dried on silica gel and product purified through column chromatography. Solvents of column chromatography were ether and ethyl acetate (9:1).

3.2.4. Synthesis of N-[1-(4-nitrophenyl)-3-oxo-3-propyl] acetamide under microwave irradiation (P3)

Reactants acetophenon (0.834mL), acetonitrile (1.673mL), 4-nitrobenzaldehyde (0.867mL), acetyl chloride (1.736mL) and zinc oxide (0.0435g) were mixed and exposed to the microwave radiations for 1.5min. The mixture shifted into 50ml cold ice water. Precipitate extracted in dichloromethane. Solution was filtered, the organic layer captivated on silica gel. Column chromatography was done for purification.

3.2.5. Synthesis of N-[1, 3(4-chlorophenyl)-3-oxopropyl]acetamide under microwave irradiation (P4)

4-chloroacetophenon (1.511ml), acetonitrile (1.916ml), zinc oxide (0.0497g), 2-chlorobenzaldehyde (1.371ml) and acetyl chloride (2.270ml) were mixed and exposed to microwave radiations for 1min. After completion, material poured into ice cold water(50mL). Precipitate dissolved into dichloromethane. The solutions undergo the filtration technique to collect the zinc oxide. Organic material entrapped at silica gel. Separating technique, column chromatography, performed to collect the pure product.

4. Results & Discussion

The percentage yields of synthesized compounds by both conventional method as well as microwave approach and time taken by the reactions as well as melting points of the fabricated compounds was recorded (Table 1, Table 2 and Table 3 respectively).

Table 1: Percentage yield of fabricated compounds

Compound	Percentage yield (%)	
	Conventional	Microwave
P1	76	83
P2	78	83.9
P3	81.56	88
P4	89	92

Table 2: Reaction time of compounds

Compound	Time (s)	
	Conventional	Microwave
P1	25, 200	110
P2	21, 000	80
P3	21, 600	90
P4	18, 000	70

Table 3: Melting points of Compounds

Compound	Melting points(°C)	
	Conventional	Microwave
P1	102	104
P2	148	147
P3	151	153
P4	161	159

UV spectra were recorded within the range of 200-600 nm on Hitachi U-2800 spectrophotometer.

Table 4: UV/Vis data of synthesized compounds

Compound	Conventional λ_{max} (nm)	Microwave λ_{max} (nm)
P1	228, 268	224, 266
P2	218, 278	218, 281
P3	214, 288	216, 282
P4	216, 267	211, 246

UV-Vis data for derivatives of β -acetamido ketones synthesized by both conventional and microwave irradiation is in close approximation with each other. The peaks at lower values are result of the attachment of amino group to the carbonyl that shifted the absorption due to the $n-\pi^*$ transition to a shorter wavelength while the other

peaks at higher values are consequence of $\pi-\pi^*$ transition occurring due to the presence of aromatic ring.

FTIR spectra of all fabricated compounds were recorded on Midac USA M-2000 FTIR spectrophotometer. (Table 5a, 5b). FTIR spectra for all synthesized compounds showed approximately similar values for conventional and microwave-assisted method. The FTIR spectra showed significant bands in finger print region; the peaks at region of $1250-1280\text{ cm}^{-1}$ showed the $\text{C}=\text{O}$ stretch for amides. Then the next IR bands in the region of $3000-3250\text{ cm}^{-1}$ confirmed the amide functional group in the products. Aromatic ring presence was indicated by the peaks in $1600-1400\text{ cm}^{-1}$ region. The carbonyl group existence was cleared with the peaks at region of $1650-1750\text{ cm}^{-1}$. A very strong peak at region of $700-780\text{ cm}^{-1}$ was observed due to C-Cl stretch in the spectrum of **P2**. In **P3** spectrum, nitro group presence was showed by the peaks in the region of $1500-1580\text{ cm}^{-1}$ and in **P4** spectrum, the stretch due to Cl was appeared at peak $780-784\text{ cm}^{-1}$.

Table 5 (a): FTIR data of compounds synthesized by conventional method

Compound	Conventional Wave number (cm^{-1}) Absorption intensity
P1	1260.17, 3251.34, 1600-1400, 1720.56, 1260.17, 3108.57, 1593.79, 744.67
P2	1260.17, 3251.34, 1600-1400, 1720.56, 1260.17, 3108.57, 1593.79, 744.67
P3	1256.67, 3014.34, 1600-1400, 1730.56, 1260.17, 3148.57, 1576.23, 699.24
P4	1260.67, 3251.34, 1600-1400, 1630.56, 1496.10, 3178.34, 1687.63, 784.67

Table 5 (b): FTIR data of compounds synthesized by microwave-assisted method

Compound	Microwave Wave number (cm^{-1}) Absorption intensity
P1	1256.22, 3191.34, 1600-1400, 1700.56, 1278.17, 3108.57, 1613.79, 742.67
P2	1280.17, 3051.34, 1600-1400, 1700, 1247.17, 3258.57, 1253.79, 738.67
P3	1275.31, 3141.67, 1600-1400, 1730.56, 1260.17, 3128.07, 1511.79, 714.67
P4	1260.17, 3251.34, 1600-1400, 1700.56, 1380.37, 3038.57, 1623.22, 780.11

Mass spectra of all compounds synthesized by conventional as well as microwave irradiation method were taken by **GCMSSchimidzo QP-2010 Spectrometer** (Table 6).

Table 6: Mass spectral data of synthesized compounds

Compound	Formula	Mass Spectrometry	
		Conventional	Microwave
P1	$\text{C}_{17}\text{H}_{17}\text{NO}_2$	268 (M+H)	268 (M+H)
P2	$\text{C}_{17}\text{H}_{16}\text{ClNO}_2$	303 (M+H)	303 (M+H)
P3	$\text{C}_{17}\text{H}_{15}\text{N}_2\text{O}_4$	313 (M+H)	313 (M+H)
P4	$\text{C}_{17}\text{H}_{14}\text{Cl}_2\text{NO}_2$	320 (M+H)	320 (M+H)

5. List of Abbreviations

Sr. No.	Compound Name	Abbreviation
1	N-(1, 3-diphenyl-3-oxopropyl) acetamide	P1
2	N-[1-(4-chlorophenyl)-3-phenyl-oxopropyl] acetamide	P2
3	N-[1-(4-nitrophenyl)-3-oxo-3-propyl]acetamide	P3
4	N-[1, 3(4-chlorophenyl)-3-oxopropyl]acetamide	P4

6. Conclusion

This reported work was designed to synthesize important reactive intermediate i.e.; β - acetamido ketones using simple and easily available catalyst (ZnO) under microwave irradiation. Furthermore, a comparison was established between a conventional and a novel (microwave) approach in order to signify the importance of microwave method. Reduced reaction time and improved yield with high purity under microwave technique are the advantageous points over conventional method depicting that former technique can be a first choice of synthetic chemists.

The structure elucidations of fabricated compounds were carried out via FTIR, UV/Vis & GC-MS.

7. Future Scope

Microwave-assisted synthesis has taken its distinct position in Organic Chemistry to synthesize a large number of organic compounds because of its enormous advantages. Use of this green approach gives better results in reduced time and cost. It will become a key source to synthesize a large number of compounds on industrial scale.

References

- [1] Meketa, A.S.; Samita, J.; Desai, K.R., Scholars Research Library, 4 (1), 645-661, 2012
- [2] Sunil, N.D.; Nagnnath, D. K.; Jaiprakash, N. S., Green Chemistry, 5, 643-648, 2012.
- [3] Rafiee, E.; Paknezhad, F.; Shahebrahimi, S.; Eavani, S.; Rashidzadeh, S., Journal Of Molecular Catalysis, 282, 92-98, 2008.
- [4] Dinanath, D. P.; Dnyandeo, K. M.; Gurumeet, C. W., International Journal of Institute Pharmacy and Life Science, 1, 212-213, 2011.
- [5] Sunil, N.D.; Nagnnath, D. K.; Jaiprakash, N. S., Green Chemistry, 5, 643-648, 2012.
- [6] Ali, J.; Majid, H. H.; Fatemeh, F.B., Springer-verlag, 143, 831-834, 2011
- [7] Lingaiah, N.; Rajashaker, B. and Rakesh, P., Applied Catalysis, 332, 304-309, 2007.
- [8] Abu, T. K; Lokman, H. C.; Tasneem, P. and Asif, A., Tetrahedron letters, 47, 8137-8141, 2006.
- [9] Majid, M.H.; Leila, R.; Fatemeh, D. and Fatemeh, F. B., Catalysis Communications, 8, 289-291, 2007.

- [10] Rameshwar, P. P. and Yong, R. L., Bull. Korean Chem. Soc., 11, 3559-3563, 2012.
- [11] Ahmad, R.; Maryam, S.; Motahareh, H., Turk J. Chem., 33, 751-758, 2009.
- [12] Zahed, K. and Korosh, M., The Scientific World Journal, 47, 268-270, 2012.
- [13] Lokman, H. C.; Abu, T.K.; Tasneem, P.; Mohammad, A.A., Tetrahedron Letters, 47, 8137-8141, 2006.
- [14] Farahnaz, K. B.; Sara, S., Eur. Chem. Bull., 2, 832-835, 2013

Authors Profiles

Dr. Bushra Khan received the MSc and PhD degree in analytical chemistry from Punjab University Lahore Pakistan. Now she is a Professor of Meritorious, Dean of natural sciences and Head of chemistry department of Lahore College for women University Lahore. She is teaching and conducting research of graduate and postgraduate students. Her research papers have been published in various journals.

Dr. Shahana Ehsan received MSc and PhD degree from Punjab University and Lahore College for women University Pakistan respectively. Now she is assistant professor and her field of research is organic chemistry especially synthetic Chemistry.

Mrs. Tahira Saghir did her MS in organic chemistry from Lahore College for Women University, Lahore, Pakistan. She is a PhD scholar of Lahore College

Ms. Warda Tul Zahra did her BS in organic chemistry with distinction, now she is student of MS

