In the present investigation the following units of work have been accomplished:

1. A number of new \( \alpha, \beta \)-ethylenic sulphones have been prepared by the condensation of different aryl aldehydes with phenyl-, \( \alpha \)-tolyl- and \( \beta \)-chlorobenzensulphonylecletic acids.

2. The ultraviolet absorption spectra of all these \( \alpha, \beta \)-ethylenic sulphones have been recorded and analysed. All these sulphones exhibited a long wavelength band around 260-320 nm and a second band around 270-236 nm. Another strong band with high intensity appeared in the spectra of all these compounds around 200-210 nm. It is observed that an ortho substituent present in the phenyl ring attached to the carbon-carbon double bonds causes a hypochromic shift along with a hypochromic effect whereas a para substituent causes a bathochromic shift along with a hyperchromic effect.

3. The infrared spectra of all these sulphones have been recorded and an attempt has been made to correlate the spectral characteristics to the configuration of these compounds.
The spectra of all these sulphones showed bands in the region 1630-1690 cm\(^{-1}\). A medium to strong bond in the region 1000-970 cm\(^{-1}\) which is a very characteristic absorption due to the \(\text{C}^\equiv\text{C}\) out-of-plane deformation in trans disubstituted ethylenic compounds, has been observed for all these compounds.

By analogy with \(\alpha,\beta\)-ethylenic sulphones reported earlier by the same method of preparation and IR spectral data, it may be concluded that all these compounds are trans isomers.

All these unsaturated sulphones have shown characteristic bands for \(\text{C}^\equiv\text{C}\) and sulphonyl groups in the regions 1100-1070 cm\(^{-1}\); and 1350-1200 and 1160-1170 cm\(^{-1}\) respectively.

3. A number of \(1-(\text{arenesulphonyl})-2\)-arylcyclopropanes have been prepared by the treatment of dimethylsulphonium methyldide with \(\alpha,\beta\)-ethylenic sulphones.

5. The ultraviolet absorption spectra of all these aryl cyclopropyl sulphones have been recorded and analysed. All these compounds exhibited a long wavelength band in the region 270-300 nm with low intensity and a second band around 221-237 nm region with a very high intensity. Another strong band with high intensity showed in the spectra of all these compounds around 200-207 nm. It is interesting
to note that the intensity of long-wavelength band (2200-3000 cm\(^{-1}\)) is about 10 to 30 times weaker than the intensity of the corresponding band appearing for \(\alpha,\beta\)-ethylenic sulphones.

6. The infrared spectra of all these cyclopropyl sulphones have been recorded and analysed. Characteristic bands for cyclopropene methylene group in the region 3055-3030 cm\(^{-1}\) were exhibited by nearly fifty percent of the compounds and four compounds showed bands in the region 3100-3070 cm\(^{-1}\). They exhibited bands in the region 1035-1000 cm\(^{-1}\) which may be considered as a positive evidence for the presence of cyclopropane ring present in all these compounds. They exhibited bands with varying intensities at 1122-1000 and 940-908 cm\(^{-1}\) which were considered to be characteristic for the trans configuration of these compounds.

7. The nuclear magnetic resonance spectra for 18 compounds have been recorded and analysed. In the case of all these aryl cyclopropyl sulphones, the complex multiplets for the cyclopropane ring appeared in the regions 1.18-2.18 ppm (for CH\(_3\) group) and 2.44-3.54 ppm (for CH group). The aryl and arylsulphonyl groups showed signals in the regions 6.34-7.50 and 7.28-8.15 ppm. The complex multiplets exhibited by these compounds in specific regions were considered to be
characteristic of trans isomers.

The stereoselective procedure adopted for the preparation of these aryl cyclopropyl sulphones, infrared and n.m.r. spectral data confirm that all these compounds are trans isomers.

8. Nine pairs of known cis and trans unsaturated disulphones were prepared stereoselectively and the dipole moments for seven pairs have been determined. (E)-1,2-bis(n-tolylsulphonyl)stilbene and (E)-1-phenylsulphonyl-2-p-tolylsulphonyl-stilbene were insoluble in benzene and dioxane and dipole moments for the corresponding cis(?) isomers only were determined. All the cis compounds have higher dipole moments in comparison to their corresponding trans isomers.

These dipole moment values confirm the stereochemical configurations assigned to them by the earlier workers on the basis of their synthesis and spectral studies.

9. The new compounds prepared during this investigation were:

(E)-1-(p-acetamidophenyl)-2-(benzenesulphonyl)ethene, m.p. 82-83°.
(E)-1-(m-bromophenyl)-2-(benzenesulphonyl)ethene, m.p. 103-104°.
(E)-1- (p-bromophenyl)-2-(benzenesulphonyl)ethene, m.p. 154-155°.

(E)-1- (m-bromo-p-nitrophenyl)-2-(benzenesulphonyl)ethene, m.p. 157-158°.

(E)-1- (m-chlorophenyl)-2-(benzenesulphonyl)ethene, m.p. 98.5-99°.

(E)-1- (2,3-dimethoxyphenyl)-2-(benzenesulphonyl)ethene, m.p. 114-115°.

(E)-1- (2,5-dimethoxyphenyl)-2-(benzenesulphonyl)ethene, m.p. 135-136°.

(E)-1- (3,4-dimethoxyphenyl)-2-(benzenesulphonyl)ethene, m.p. 142-143°.

(E)-1- (o-ethoxyphenyl)-2-(benzenesulphonyl)ethene, m.p. 91-92°.

(E)-1- (o-fluorophenyl)-2-(benzenesulphonyl)ethene, m.p. 85-86°.

(E)-1- (p-isopropylphenyl)-2-(benzenesulphonyl)ethene, m.p. 104-105.5°.

(E)-1- (o-methylphenyl)-2-(benzenesulphonyl)ethene, m.p. 84-84.5°.

(E)-1- (1-naphthyl)-2-(benzenesulphonyl)ethene, m.p. 102-103°.

(E)-1- (1-pyrene)-2-(benzenesulphonyl)ethene, m.p. 195-196°.

(E)-1- (p-acetamidophenyl)-2-(p-toly1sulphonyl)ethene, m.p. 178-179°.

(E)-1- (o-bromophenyl)-2-(p-toly1sulphonyl)ethene, m.p. 121-122°.
(E)-1-(m-bromophenyl)-2-(p-tolylsulphonyl)ethene, m.p. 89-90.5°.

(E)-1-(p-bromophenyl)-2-(p-tolylsulphonyl)ethene, m.p. 161-162°.

(E)-1-(m-bromo-p-methoxyphenyl)-2-(p-tolylsulphonyl)ethene, m.p. 140-140.5°.

(E)-1-(o-chlorophenyl)-2-(p-tolylsulphonyl)ethene, m.p. 108-103°.

(E)-1-(m-chlorophenyl)-2-(p-tolylsulphonyl)ethene, m.p. 84-85°.

(E)-1-(2,3-dimethoxyphenyl)-2-(p-tolylsulphonyl)ethene, m.p. 127-128°.

(E)-1-(2,5-dimethoxyphenyl)-2-(p-tolylsulphonyl)ethene, m.p. 119-120°.

(E)-1-(3,4-dimethoxyphenyl)-2-(p-tolylsulphonyl)ethene, m.p. 126-127°.

(E)-1-(o-ethoxyphenyl)-2-(p-tolylsulphonyl)ethene, m.p. 105-109°.

(E)-1-(o-fluorophenyl)-2-(p-tolylsulphonyl)ethene, m.p. 73-74°.

(E)-1-(p-fluorophenyl)-2-(p-tolylsulphonyl)ethene, m.p. 96.5-97°.

(E)-1-(p-hydroxyphenyl)-2-(p-tolylsulphonyl)ethene, m.p. 108-110°.

(E)-1-(o-methylphenyl)-2-(p-tolylsulphonyl)ethene, m.p. 85-89°.

(E)-1-(p-naphthyl)-2-(p-tolylsulphonyl)ethene, m.p. 159.5-160.5°.
(E)-1-(1-naphthyl)-2-(p-tolylsulphonyl)ethene, m.p. 188-190°.

(E)-1-(2-pyridyl)-2-(p-tolylsulphonyl)ethene, m.p. 87-88°.

(E)-1-(p-acetamidophenyl)-2-(p-chlorobenzensulphonyl)ethene, m.p. 206-208°.

(F)-1-(o-bromophenyl)-2-(p-chlorobenzensulphonyl)ethene, m.p. 149-150°.

(F)-1-(p-bromophenyl)-2-(p-chlorobenzensulphonyl)ethene, m.p. 184-185°.

(F)-1-(m-bromo-p-methoxyphenyl)-2-(p-chlorobenzensulphonyl)ethene, m.p. 149-150°.

(F)-1-(o-chlorophenyl)-2-(p-chlorobenzensulphonyl)ethene, m.p. 130-131°.

(F)-1-(m-chlorophenyl)-2-(p-chlorobenzensulphonyl)ethene, m.p. 130-131°.

(B)-1-(2,4-dichlorophenyl)-2-(p-chlorobenzensulphonyl)ethene, m.p. 153-154°.

(B)-1-(3,4-dichlorophenyl)-2-(p-chlorobenzensulphonyl)ethene, m.p. 164-165°.

(F)-1-(2,3-dimethoxyphenyl)-2-(p-chlorobenzensulphonyl)ethene, m.p. 125-126°.

(B)-1-(2,5-dimethoxyphenyl)-2-(p-chlorobenzensulphonyl)ethene, m.p. 114-115°.

(B)-1-(o-ethoxyphenyl)-2-(p-chlorobenzensulphonyl)ethene, m.p. 110-111°.

(B)-1-(o-fluorophenyl)-2-(p-chlorobenzensulphonyl)ethene, m.p. 103-104°.
(R)-1-(p-fluorophenyl)-2-(p-chlorobenzensulphonyl)-ethene, m.p. 118-118.5°.

(R)-1-(p-isopropylphenyl)-2-(p-chlorobenzensulphonyl)-ethene, m.p. 117-117.3°.

(R)-1-(o-methylphenyl)-2-(p-chlorobenzensulphonyl)-ethene, m.p. 135.6-136°.

(R)-1-(p-methylphenyl)-2-(p-chlorobenzensulphonyl)-ethene, m.p. 124-125°.

(R)-1-(o-nitrophenyl)-2-(p-chlorobenzensulphonyl)-ethene, m.p. 174-175°.

(R)-1-(m-nitrophenyl)-2-(p-chlorobenzensulphonyl)-ethene, m.p. 141-142°.

(R)-1-(p-nitrophenyl)-2-(p-chlorobenzensulphonyl)-ethene, m.p. 197-198°.

(R)-1-(1-naphthyl)-2-(p-chlorobenzensulphonyl)-ethene, m.p. 136.8-137°.

(R)-1-(2-naphthyl)-2-(p-chlorobenzensulphonyl)-ethene, m.p. 162-163°.

(R)-1-(9-anthryl)-2-(p-chlorobenzensulphonyl)-ethene, m.p. 184-185°.

(R)-1-(1-pyrene)-2-(p-chlorobenzensulphonyl)-ethene, m.p. 204-205°.

trans-1-(benzenesulphonyl)-2-(m-bromo-p-methoxyphenyl)cyclopropane, m.p. 123-124°.

trans-1-(benzenesulphonyl)-2-(o-chlorophenyl)cyclopropane, m.p. 60-61°.

trans-1-(benzenesulphonyl)-2-(3,4-dichlorophenyl)cyclopropane, m.p. 130-131°.
trans-1-(benzenesulphonyl)-2-(p-dimethylaminophenyl)-cyclopropane, m.p. 167.5-169°.

trans-1-(benzenesulphonyl)-2-(2,3-dimethoxyphenyl)-cyclopropane, m.p. 100-101°.

trans-1-(benzenesulphonyl)-2-(3,4-dimethoxyphenyl)-cyclopropane, m.p. 82-83°.

trans-1-(benzenesulphonyl)-2-(1-naphthyl)cyclopropane, m.p. 163-164°.

trans-1-(p-tolylsulphonyl)-2-(m-bromo-p-methoxyphenyl)-cyclopropane, m.p. 148-149°.

trans-1-(p-tolylsulphonyl)-2-(p-chlorophenyl)cyclopropane, m.p. 80-80.5°.

trans-1-(p-tolylsulphonyl)-2-(p-chlorophenyl)cyclopropane, m.p. 127-128°.

trans-1-(p-tolylsulphonyl)-2-(3,4-dichlorophenyl)cyclopropane, m.p. 141.5-143°.

trans-1-(p-tolylsulphonyl)-2-(3,3-dimethoxyphenyl)cyclopropane, m.p. 126-127°.

trans-1-(p-tolylsulphonyl)-2-(3,4-dimethoxyphenyl)cyclopropane, m.p. 98-99.5°.

trans-1-(p-tolylsulphonyl)-2-(p-tolyl)cyclopropane, m.p. 145-146°.

trans-1-(p-tolylsulphonyl)-2-(p-methoxyphenyl)cyclopropane, m.p. 85.5-96.5°.

trans-1-(p-tolylsulphonyl)-2-(2-naphthyl)cyclopropane, m.p. 195-197°.

trans-1-(p-chlorobenzenesulphonyl)-2-(p-bromophenyl)-cyclopropane, m.p. 118.5-119°.
trans-1-(p-chlorobenzensulphonyl)-2-(n-bromo-p-methoxyphenyl)cyclopropane, m.p. 100-101°.

trans-1-(p-chlorobenzensulphonyl)-2-(p-chlorophenyl)-cyclopropane, m.p. 91-92°.

trans-1-(p-chlorobenzensulphonyl)-2-((2,4-dichlorophenyl)-cyclopropane, m.p. 102-103°.

trans-1-(p-chlorobenzensulphonyl)-2-((3,4-dichlorophenyl)-cyclopropane, m.p. 120-120.5°.

trans-1-(p-chlorobenzensulphonyl)-2-((2,3-dimethoxyphenyl)-cyclopropane, m.p. 133-136°.

trans-1-(p-chlorobenzensulphonyl)-2-((2,5-dimethoxyphenyl)-cyclopropane, m.p. 127-128°.

trans-1-(p-chlorobenzensulphonyl)-2-(p-fluorophenyl)-cyclopropane, m.p. 102-103°.

trans-1-(p-chlorobenzensulphonyl)-2-(p-isopropylphenyl)cyclopropane, m.p. 96-97°.


trans-1-(p-chlorobenzensulphonyl)-2-(p-methoxyphenyl)-cyclopropane, m.p. 140-141°.

trans-1-(p-chlorobenzensulphonyl)-2-(2-naphthyl)cyclopropane, m.p. 176-179.5°.

trans-1-(p-chlorobenzensulphonyl)-2-(1-pyrene)cyclopropane, m.p. 197.5-199°.