
TABLE OF CONTENTS

List of Figures	IX
List of Tables	XIII
Abbreviations	XIX
Chapter 1 Introduction	1-29
1.1 Introduction	1
1.1.1 Discovery of fullerene	2
1.2 Production	2
1.2.i Electric Arc Discharge	
1.2.ii Laser Ablation	
1.2.iii Chemical Vapor Deposition	
1.3 Structure	5
1.4 1.4.1 Physical Properties	7
1.4.2 Thermodynamic and Kinetic stability of C ₆₀	7
1.4.3 Solubility of C ₆₀	8
1.4.4 Fullerenes in water	13
1.5 Chemistry	21
1.6 Reactions of [60] fullerene	24
1.7 Applications	25
1.7.1 Polymers	26
1.7.2 Thin Films	26
1.7.3 Electro optical devices	27
1.7.4 Liquid crystals	27
1.7.5 Bio medicine	27
1.7.6 Skin care	29
1.7.7 Water- soluble fullerene derivatives	29
1.7.8 Protective effects of carboxy fullerenes	30
1.7.9 Antiviral activity	30
1.7.10 Fullerenes as drug and gene delivery agents	31
Aim of the Thesis	32

Chapter 2	Experimental	34-40
2.1	Miscibility Study of [60] fullerene using non ionic surfactants Tween 80, Triton X 100 and ionic surfactants SDS, CTAB	34
2.1.1	Introduction	34
2.1.2	Materials	34
2.1.3	[60] fullerene and its microemulsion studies with non ionic surfactants Tween 80 & Triton X 100, anionic surfactants SDS & CTAB	34
2.1.3.1	Phase transition to emulsion	35
2.1.3.2	Transition from emulsion to microemulsion	37
2.1.3.3	Phase behavior study	38
2.1.3.4	Critical reverse micelle formation	38
2.1.3.5	Fluorescence study of microemulsions of [60] fullerene	39
Chapter 3	Results and Discussion	41-128
3.1	Effect of change in concentration of solvent in phase transition of microemulsion to emulsion	41
3.1.a	Phase transition of microemulsion to emulsion with Tween 80	42
3.1.b	Phase transition of microemulsion to emulsion with Triton X 100	47
3.1.c	Phase transition of microemulsion to emulsion with SDS	52
3.1.d	Phase transition of microemulsion to emulsion with CTAB	57
3.2	Phase behavior study	63
3.3	Critical reverse micelle formation (C_{rcmc})	117
3.4	Fluorescence studies of [60] fullerene –Toluene solution-water-surfactant-cosurfactant microemulsion system	126
Chapter 4	Conclusions	129-132
	Summary of the Work	133-134
	References	135-144
	List of Publications	145
	List of Presentations	146-147
