

Table of Contents

Chapter 1	INTRODUCTION	1
1.1	BACKGROUND	1
1.2	DEFINITION OF PROBLEM, AIMS AND OBJECTIVES	1
1.3	ORGANISATION	3
Chapter 2	THEORY OF COMPRESSIBLE CAKES	4
2.1	GENERAL THEORY OF COMPRESSION	4
2.2	HYDRAULIC COMPRESSION	6
2.2.1	Variations in Voidage	9
2.2.2	Variations in Permeability	10
2.2.3	Variations in Resistance to Tangential Shears	11
2.3	EFFECTS CAUSED BY HYDRAULIC COMPRESSION	12
2.3.1	Skin Effect	12
2.3.2	Insensitivity to Operating Variables	13
2.3.3	Dependence of Filtrate Flux on Operating Path	13
Chapter 3	CHARACTERISATION OF COMPRESSION-PERMEABILITY-VOIDAGE (CPV) DATA	15
3.1	MODELS	16
3.2	THEORY, APPARATUS AND PROCEDURE	18
3.2.1	Compression-Permeability (C-P) Cell	18
3.2.1.1	Theory of Operation	18
3.2.1.2	Apparatus and Procedure	19

3.2.2	Settling Method	22
3.2.2.1	Theory	22
a	Determination of Porosity	22
b	Determination of Permeability	24
3.2.2.2	Apparatus and procedure	28
a	Porosity	28
b	Permeability	28
3.2.3	Centrifuge Method	28
3.2.3.1	Theory	29
3.2.3.2	Apparatus and Procedure	31
3.3	RESULTS	32
3.3.1	C-P Cell Experiments	32
3.3.2	Settling Experiments	35
3.3.2.1	Determination of Porosity	35
3.3.2.2	Determination of Permeability	37
3.3.3	Centrifuge Experiments	39
3.3.4	Fitting of Porosity and Permeability Data to Standard Equations	41
3.3.4.1	Permeability Data	41
3.3.4.2	Porosity Data	43
3.3.4.3	Porosity and Permeability Data for Error Analysis	45
3.4	SUMMARY OF CHAPTER 3	47
Chapter 4	PREDICTION OF FILTER PERFORMANCE	49
4.1	EQUATIONS	49
4.1.1	Relationships between P_s and P_L	49

4.1.2	Pressure Drop Relationships	51
4.1.3	Mass Balances	52
4.1.4	Time Relationships for Constant Pressure Filtration	52
4.1.5	Solution Procedure	53
4.2	RESULTS : CONSTANT PRESSURE PLANAR FILTRATION	54
4.3	RESULTS : INTERNAL CYLINDRICAL FILTRATION	59
4.4	COMPARISON BETWEEN EXTERNAL CYLINDRICAL, INTERNAL CYLINDRICAL AND PLANAR FILTRATION	64
4.5	SUMMARY OF CHAPTER 4	68
Chapter 5	CONCLUSION	69
Chapter 6	RECOMMENDATIONS	71