

REFERENCES

1. La Fraugh, R. W. "The Use of Superplasticizers in the Precast Industry"; International Symposium on Superplasticizers in Concrete, Ottawa, Canada May 1978.
2. Locher, F. W. "Schriftenreihe der Zementindustrie"; Vol. 40, 1973, pp 11-22 (German).
3. Hester, W. T. "High Range Water-Reducing Admixtures in Precast Concrete Operations"; Prestressed Concrete Institute Journal, July/August 1978.
4. Hester, W. T. "Field Applications of High Range Water Reducing Admixtures"; International Symposium on Superplasticizers in Concrete, Ottawa, Canada, May 1978.
5. Mailvaganam, N. P. "Slump Loss in Flowing Concrete"; International Symposium on Superplasticizers in Concrete, Ottawa, Canada, May 1978.
6. Ravina, D. "Retempering of prolonged mixed concrete with admixtures in hot weather; ACI Journal proceedings, LXXII No. 6, pp 291-295; June 1975.
7. Previte, R. W. "Concrete Slump Loss"; ACI Journal Proceedings, LXXIV, No. 8, pp 361-367; August 1977.
8. Seabrook, P. T. and Malhotra, V. M. "Accelerated strength testing of superplasticized concrete and the effect of repeated doses of Superplasticizers on Properties of Concrete"; International Symposium on Superplasticizers in Concrete, Ottawa, Canada, May 1978.
9. Perenchio, W. F., Whiting, D. A. and Kantro, D. L. "Water Reduction, Slump Loss and Entrained Air Void Systems as influenced by Superplasticizers"; International Symposium on Superplasticizers in Concrete, Ottawa, Canada, May 1978.
10. "Superplasticizing Admixtures in Concrete"; Joint Working Party Report 45-030. U.K.: Cement and Concrete Association and Cement Admixtures Association; January 1976.
11. "Hot Weather Concreting"; ACI Committee 305 Report of ACI Journal proceedings, Vol. LXXIV, No. 4; pp 319-320; August 1977.
12. Fookes, P. G. and Collis, L. "Problems in the Middle East"; Concrete, Vol. 9, No. 7, 1975.
13. Harrison, W. H. "Concrete and soluble salts in arid climates"; H.M.S.O. Overseas Building Notes, No. 139, 1971.
14. Browne, R. D. and Blundell, R. "Water Reducing Agents - Effect on long term properties of Concrete"; Symposium on Admixtures for Concrete, Cement and Concrete Association U.K., 1975.
15. Newman, A. J. "Problems of Concreting in arid climates"; H.M.S.O. Overseas Building Notes, No. 139, 1971.



TABLE I

CHEMICAL COMPOSITION OF A LOCAL CEMENT

CEMENT - Type I JACAPRATHAN A.S.T.M. Designation C 150-75

1. Chemical Composition	Percent
Silicon Dioxide (SiO <sub>2</sub> ).....	21.52
Aluminium Oxide (Al <sub>2</sub> O <sub>3</sub> ).....	4.95
Ferric Oxide (Fe <sub>2</sub> O <sub>3</sub> ).....	3.57
Calcium Oxide (CaO).....	64.43
Magnesium Oxide (MgO).....	1.81
Sulfur Trioxide (SO <sub>3</sub> ).....	2.36
Free Lime (CaO).....	0.72
Loss on Ignition.....	0.67
Insoluble Residue.....	0.15
Total Alkalies.....	0.64
Tricalcium Silicate (C <sub>3</sub> S).....	53.11
Tricalcium Aluminate (C <sub>3</sub> A).....	7.08
Dicalcium Silicate (C <sub>2</sub> S).....	21.72
Tetra Calcium aluminoferrite(C <sub>4</sub> AF).....	10.84
2. Specific Surface	
(Blaine) Sq. Cm. per Gram:.....	2984

TABLE II

CHEMICAL CONTAMINENTS PRESENT IN AGGREGATES AND WATER

	<u>% by weight</u>
<u>Total Acid Soluble Sulphates (as SO<sub>3</sub>)</u>	
Coarse aggregate	0.02 - 2.65
Fine aggregate	0.05 - 3.51
Water	up to - 0.04
<u>Total Acid Soluble Chlorides (as NaCl)</u>	
Coarse aggregate	0.04 - 0.54
Fine aggregate	0.04 - 1.60
Water	up to - 0.16

These figures are dependent on the location, quarry and the depth of the deposit. The concentrations are found to increase as the aggregate size decreases.

Note: Suggested maximum salt contents for concretes in the Middle East is 4.0% and 0.5% by weight of cement for sulphates and chlorides respectively.



FIG. I  
 GRADATION CURVES FOR EAST COAST SAUDI ARABIAN  
 COARSE AND FINE AGGREGATES

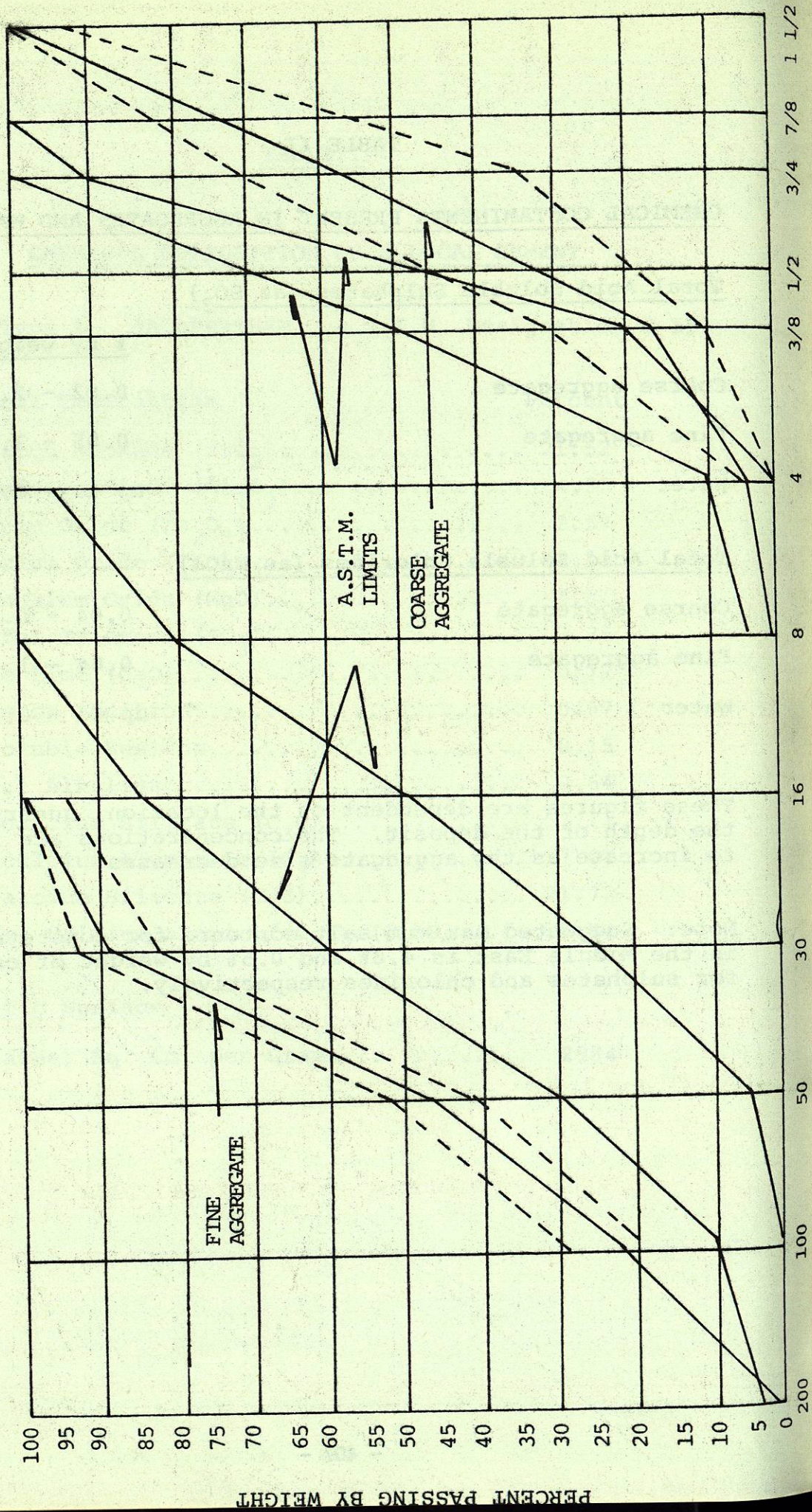


FIG. II  
 EFFECT OF VARIATION IN TEMPERATURE ON SLUMP LOSS

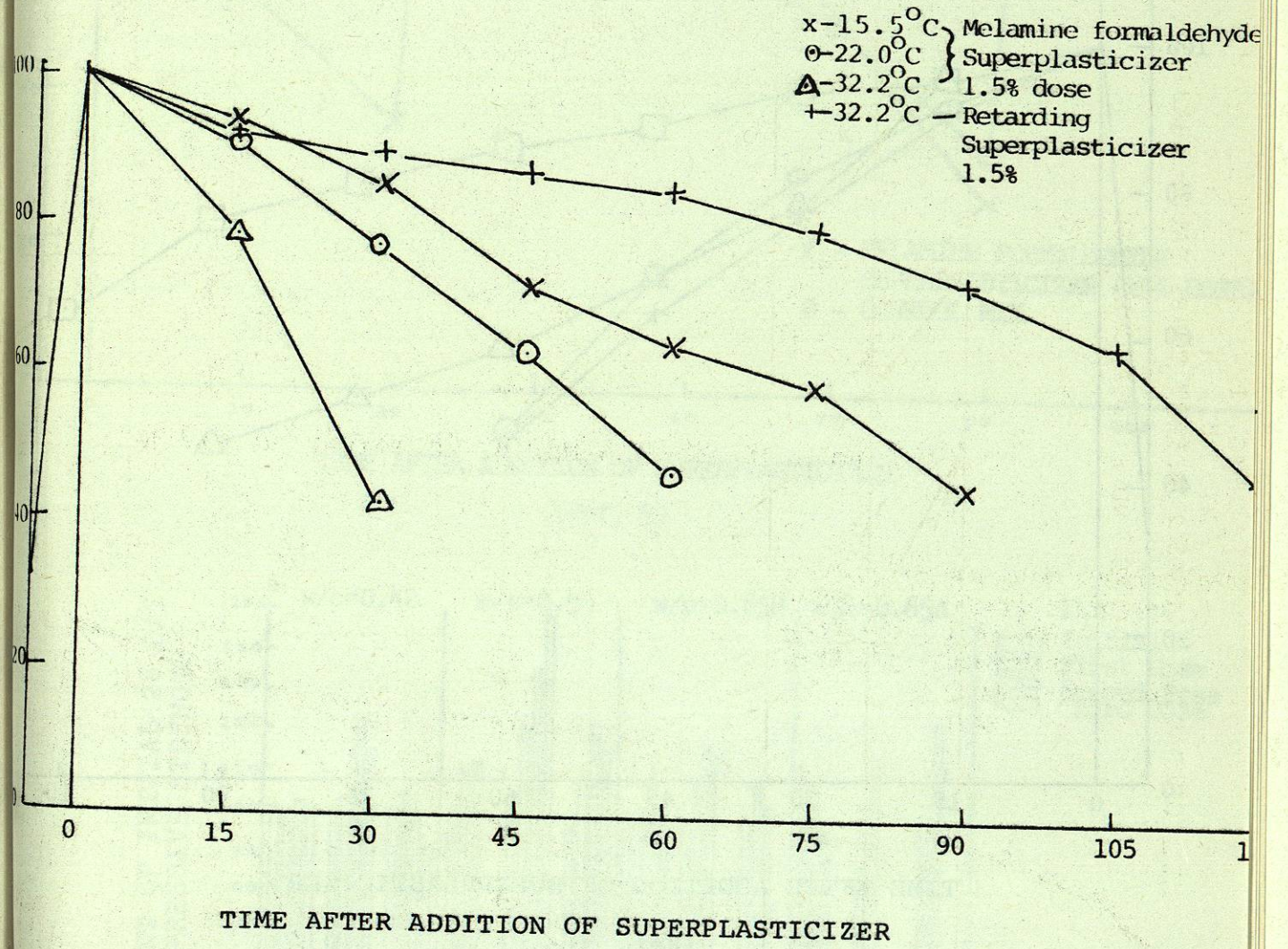




FIG. III  
EFFECT OF COMBINED ADMIXTURES ON SLUMP LOSS

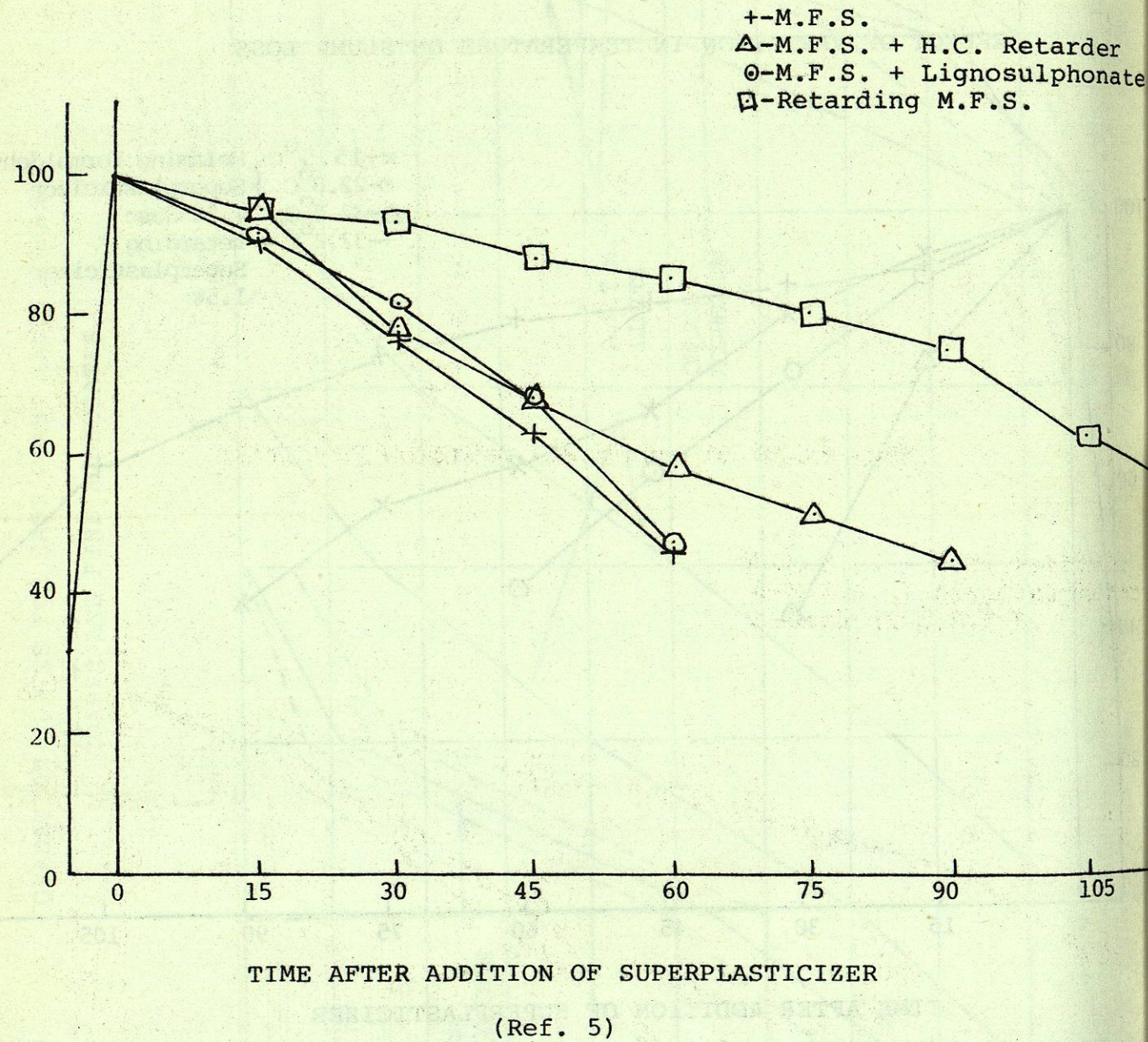


FIG. IV  
EFFECT OF REDOSAGE ON SLUMP LOSS

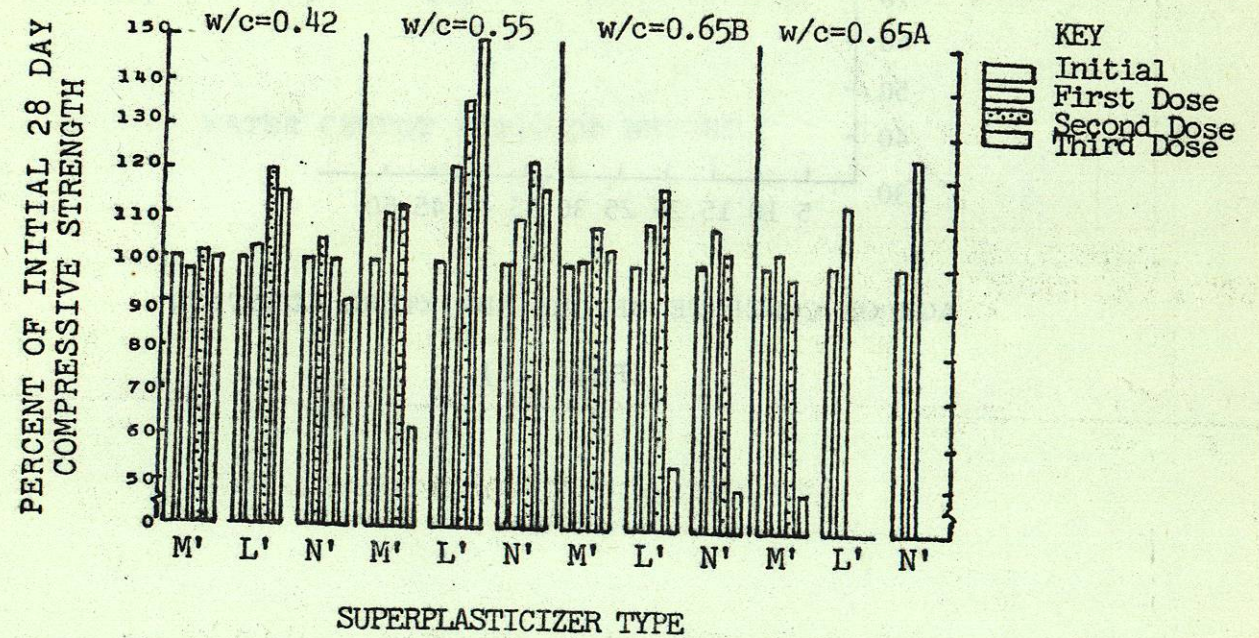
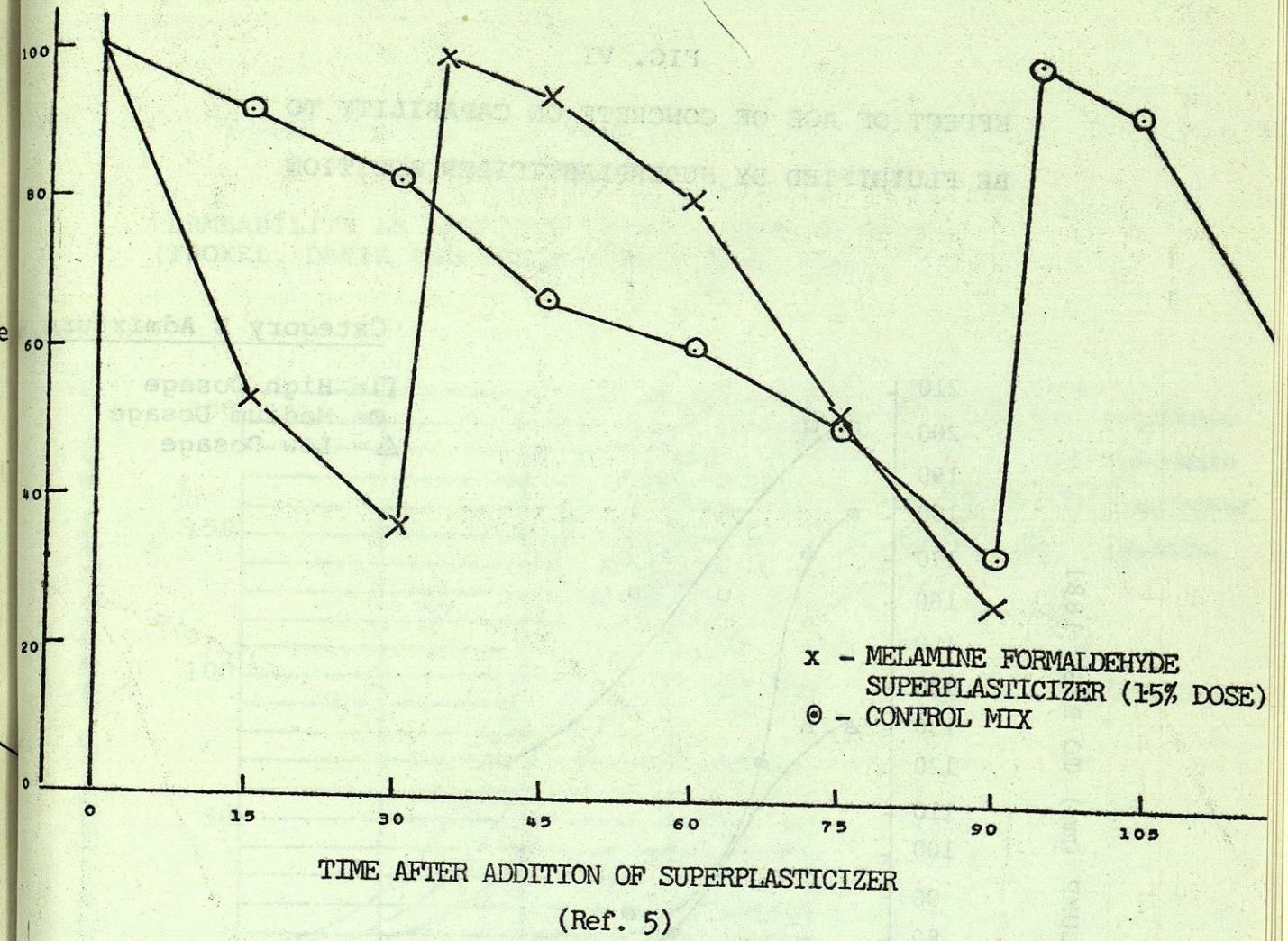


FIG. V EFFECT OF RE-DOSING OF SUPERPLASTICIZERS ON COMPRESSIVE STRENGTH OF CONCRETE