CHAPTER 4

SUMMARY AND CONCLUSIONS

The first chapter, the introduction, discussed about the importance of reusing the industrial effluent in the concrete. The literature review presents an overview on the reuse of the industrial effluent in the concrete, importance of various parameters affecting the properties of the concrete such as the effects of the concrete subjected to sulphate attack, chloride attack etc., corrosion studies, permeability, compressive strength, tensile strength, flexural strength etc using the industrial effluent. Finally the first chapter, the introduction, is concluded with a detailed scope of the project.

In the second chapter, materials used for preparing concrete samples, mix design procedures, analyzing the properties of the industrial effluent affecting the properties of the concrete and the experimental procedure for carrying out various tests on the concrete are described in detail. In the third chapter, the behaviour, results and discussions of using the untreated and treated tannery effluent, untreated and treated textile effluent for the concrete are studied and presented. Finally in the fourth chapter, the conclusion on this research work is presented as well as remarks on future developments are also suggested.

Due to sulphate attack and chloride attack, there is loss of weight and reduction in the compressive strength of the concrete samples prepared using the tannery and textile effluents. When fly ash is added along with concare or calcium nitrate while preparing the concrete, the loss of weight of
the concrete samples is decreased when subjected to sulphate attack and chloride attack and the reduction in the compressive strength is almost minimized and the compressive strength of the concrete is equal to that of the concrete specimen prepared using the conventional water (potable water). It is concluded that the sulphate attack and the chloride attack are counteracted by adding 5% fly ash and 2.5% concare or 5% fly ash and 2.0% calcium nitrate along with the concrete prepared using tannery effluents and 5% fly ash and 2.0% concare or 5% fly ash and 2.0% calcium nitrate along with the concrete prepared using textile effluents.

There is adverse effect on the reinforcement bar embedded in the concrete (concrete samples prepared using the untreated and treated tannery effluents, the untreated and treated textile effluents) due to corrosion. The loss of weight of the reinforcement bar embedded in the concrete due to corrosion is minimized by adding 5% fly ash and 2.5% concare or 5% fly ash and 2.0% calcium nitrate along with the concrete prepared using tannery effluents and 5% fly ash and 2.0% concare or 5% fly ash and 2.0% calcium nitrate along with the concrete prepared using textile effluents. Even after adding the admixtures while preparing the concrete, there is 0.25% loss of weight of the reinforcement bar embedded in the concrete due to corrosion. By coating the chempatch-R on the reinforcement bar embedded in the concrete, the loss of weight of the reinforcement bar embedded in the concrete due to corrosion is completely reduced.

The loss of weight and reduction in the compressive strength of the concrete samples subjected to chemical attack is almost same for the all the concrete samples prepared using tannery effluents, textile effluents and potable water. It is concluded that there is no significant effect on the concrete (loss of weight and reduction in the compressive strength) subjected to chemical attack. It is concluded that with the addition of admixtures, there is
equal improvement in the compressive strength of the concrete samples and
decrease in loss of weight of the concrete samples prepared using the tannery
effluents, textile effluents and potable water subjected to chemical attack.

It is observed that there is no significant expansion due to the alkali
aggregate reaction irrespective of using the tannery effluents and textile
effluents.

There is leachability of sulphate and leachability of chloride from
the concrete prepared by using the tannery effluents and textile effluents. By
the addition of 5% fly ash and 2.5% concare or 5% fly ash and 2.0% calcium
nitrate along with the concrete prepared using tannery effluents and 5% fly
ash and 2.0% concare or 5% fly ash and 2.0% calcium nitrate along with the
concrete prepared using textile effluents, the leachability of the chloride and
sulphate from the concrete is reduced.

The permeability of the concrete prepared by using the tannery
effluents and textile effluents are slightly higher than that of the concrete
prepared by using potable water. By the addition of 5% fly ash and 2.5%
concare or 5% fly ash and 2.0% calcium nitrate along with the concrete
prepared by using tannery effluents and 5% fly ash and 2.0% concare or 5%
fly ash and 2.0% calcium nitrate along with the concrete prepared by using
textile effluents, the permeability of the concrete is reduced.

There is no significant effect on the properties of the concrete such
as compressive strength, tensile strength, flexural strength of plain cement
concrete, failure load of reinforced cement concrete beam and bond strength
of the concrete prepared using the tannery effluents and textile effluents. The
addition of 5% fly ash and 2.5% concare or 5% fly ash and 2.0% calcium
nitrate along with the concrete prepared by using tannery effluents and 5% fly
ash and 2.0% concare or 5% fly ash and 2.0% calcium nitrate along with the concrete prepared by using textile effluents slightly increases the compressive strength, tensile strength, flexural strength and bond strength of the concrete. It can be concluded that there are no adverse effects on the strength properties of the concrete prepared using the tannery and textile effluents.

Though there is a little increase in cost of the building constructed using tannery and textile effluents, it safe guards the environment in that region. It reduces the scarcity of the water and also the depletion of the ground water source in that region. The reuse of the industrial effluents for construction reduces the water pollution (letting out the processed water from tanneries and textile processing units into the water bodies such as canal, river etc can be avoided). By using tannery and textile effluents for construction purpose, an effective liquid waste management can be achieved and by using the fly ash (residue from thermal power plants) as admixture along with the concrete, an effective solid waste management can be achieved.

Hence it is concluded that the tannery and textile effluents can be used for the construction purpose by adding 5% fly ash with either 2.5% concare or with 2.0% calcium nitrate along with the concrete prepared by using tannery effluents and 5% fly ash with either 2.0% concare or with 2.0% calcium nitrate along with the concrete prepared by using textile effluents for preparing the concrete.

4.1 SCOPE FOR FURTHER STUDY

1. The experiment can be studied by adding some other natural admixtures to reduce the cost of admixtures as it will benefit the cost of construction.
2. In future the work can be extended for longer periods and the results can be studied and analyzed.

3. The concrete samples can be studied and analyzed after 5 years or 10 years through scanning electron microscopy (SEM analysis) and X-ray diffraction method.

4. Feasibility of using other industrial effluent in construction can also be considered and experimented.