

Chapter Six

Conclusion and Recommendations

6.1 Conclusion:

The investigated concrete properties were slump (workability) and compressive strength. From the results of this research , the following conclusions can be concluded:

1. Exposure of concrete to the elevated temperature affects its chemical composition and physical properties. The affect is reflected by the appearance of surface cracks, loss of weight, loss of homogeneity and spalling of concrete.
2. Density and modulus of elasticity of both grades in this study are decreased similarly with increasing of temperature.
3. Within the range of the original compressive strength (without additives and with additives) which examined in this study under the impact of elevated temperature, it was found that: grade with additives have less reduction in compressive strength than this with Additives.
4. The both grades of concrete that investigated in this study in the ranges of temperature from room temperature (39^0C) up to (100^0C) show a loss in compressive strength, in fact the physical properties has changed due to elevated temperature and these changes are clear in the appearance of surface cracks and the failure mode of specimens during tests.
5. In the ranges of temperature between 100^0C and 300^0C , there is a big reduction in the compressive strength by more than 60% accompanied by disintegration of concrete. However, the reduction in the

compressive strength appears to depend on thermo-chemical reaction of cement paste and changes of physical properties of concrete.

6. The loss in compressive strength for mix design (2) with additives its Greater than losses in compressive strength for mix design (1) without additives, and the range of losses Arrive to 60% in compressive strength at 300^0C at Time 1.5 Hours, because the additives its chemical materials its helping to flammable , however the compressive strength arrive to zero at degree of Temperature more than $\{500^0\text{C}\}$.

6.2 Recommendation

From the obtained results in this study, the following recommendations can be drawn:

1. Avoid the use of additives that contain chemicals flammable in concrete structures exposed to fire.
2. Attention for mix design with high compressive strength without using chemical additives for the important Structures.
3. Highly recommend to use the fire-fighting system as first line of defense against the fire; that will reduce the severe damage that might be caused by fire.
4. Attention for thickness concrete cover in the design and construction.

6.3 Suggestion for future researches

The future fields that can be investigated by the researchers were:

1. The impact Fire on structural distortions resulting from loads of facilities.
2. Study the facility after exposure to fire and it's removal.

3. More investigating about the behavior of compressive strength under the impact of the elevated temperature.
4. More research about the behavior of concrete properties (density and modulus of elasticity) under the impact of elevated temperature; and for a broader picture it is recommended to use different mixes and material.

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